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Volume XXVII-No. 7 July, 1954

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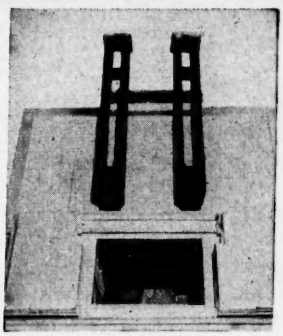
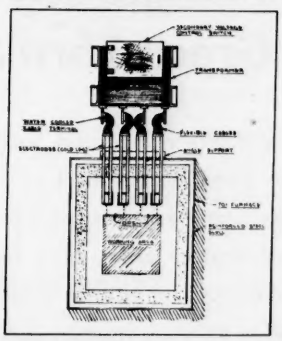
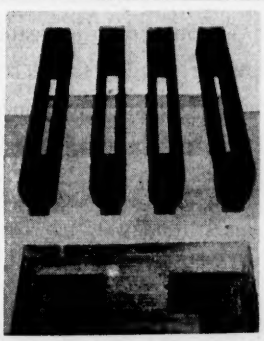


HOLDEN TYPE 701-2 Submerged Electrode Unit with removable electrodes.



Drawing of HOLDEN TYPE 701-4 Submerged Electrode Furnace.



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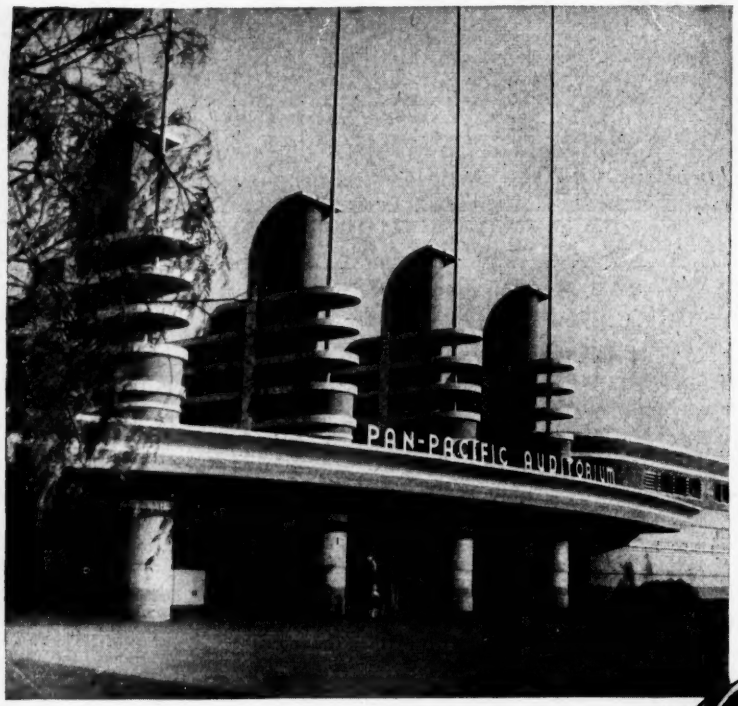
★ *Write for descriptive literature on Holden Type 701 Electrode Furnace.*

THE A. F. HOLDEN COMPANY

THREE F.O.B. POINTS—LOS ANGELES, DETROIT and NEW HAVEN

'55 WESTERN METAL EXPOSITION and CONGRESS



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W. H. EISENMAN, Managing Director *Chester L. Wells, Assistant Director*

Metals Review

VOLUME XXVIII, No. 7 July, 1954

THE NEWS DIGEST MAGAZINE

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National Officers and Past Chairmen at Hartford

National Officers and Past Chairmen Were Honored at a Meeting of the Hartford Chapter Held Recently. In the photograph are, front, from left: John Kielman (1928-29); H. J. Noble (1937-38); R. W. Woodward (1926-27); National President James Austin; National Secretary W. H. Eisenman; C. J. Umlauf (1939-40); H. J. Fischbeck (1930-31); and C. T. Hewitt (1938-39). Back row, from left: H. F. Sprague (1952-53); O. V. Hogaboom (1946-47); H. I. Moore (1931-32); F. P. Gilligan (1919-20) and past national president; L. A. Lanning (1924-25); J. A. Swift (1945-46); W. W. Wight (1948-49); D. A. Tullock (1947-48); J. C. Mertz (1950-51); R. J. Haigis (1942-43); and W. Mounce (1953-54). Dr. Austin spoke on "Metals for Tomorrow". 25-year certificates were given to W. C. Betz and J. N. Skinner. (Reported by W. Mounce for Hartford)

ASM Education and Research Foundation Offers Scholarships

The American Society for Metals Foundation for Education and Research is sponsoring for the second year scholarships in 42 American and 6 Canadian engineering schools for outstanding engineering students who are studying or who intend to study metallurgy. The scholarships, amounting to awards of $400 each, total $19,200.

The primary purpose of the scholarships for engineering students is to stimulate greater interest in the study of metallurgy. The need for qualified metallurgists is now greater than the need in any other engineering profession and those who are outstanding students in metallurgy face a bright and satisfying future. The A.S.M. Foundation desires to reward the best of the engineering students, and, in so doing, to stimulate their interest in metallurgy as one of the most important contributions to progress and national security.

The A.S.M. Foundation does not select scholarship winners, allowing the metallurgy faculty of each university to make their choice.

Distribution of the scholarships is as follows:

Pennsylvania—Carnegie Institute of Technology, Drexel Institute of Technology, Lafayette College, Lehigh University, University of Pennsylvania, Pennsylvania State University and University of Pittsburgh.

New York — Columbia University, Cornell University, New York University, Polytechnic Institute of Brooklyn and Rensselaer Polytechnic Institute.

Michigan—Michigan College of Mining and Technology, University of Michigan, Michigan State College and Wayne University.

Ohio—Case Institute of Technology, University of Cincinnati and Ohio State University.

California—University of California and Stanford University.

Indiana—University of Notre Dame and Purdue University.

Illinois—Illinois Institute of Technology and University of Illinois.

One scholarship each will be awarded to: University of Alabama, University of Arizona, Colorado School of Mines, University of Kansas, University of Kentucky, Massachusetts Institute of Technology, University of Minnesota, University of Missouri, Montana School of Mines, South Dakota School of Mines, University of Tennessee, Texas Western College of University of Texas, University of Utah, Virginia Polytechnic Institute, State College of Washington, University of Wisconsin and Yale University.

Canadian universities participating are: University of British Columbia, Universite Laval, McGill University, Nova Scotia Technical College, Queen's University and the University of Toronto.

prepares and distributes free to the metallurgical departments of colleges and universities a booklet containing data sheets and other information of interest to the student.

Toledo Chapter Holds Annual Old Timers Night

At its annual Old Timers' Night the Toledo Chapter heard Reverend R. J. Cowan, A.S.M. member for 30 years, give a most interesting and unusual talk entitled "It Seems To Me".

Rev. Cowan stated that all metallurgists are preachers. To prove his point he stated that heat treatment of people is somewhat different from that of metals, but the similarity of this and other procedures familiar to the metallurgist as applied to ministry is amazing.

Following Rev. Cowan's talk, three movies were shown, "Genii of the Flame", a 30-min. color, sound movie by Surface Combustion Corp. on the development and applications of gas for industry and home, and two excellent fishing movies, "The Mighty Muskie" and "Let's Go Fishing".— **Reported by M. M. Schrecongst for Toledo Chapter.**

ASTM Dedicates Memorial To C. Laurence Warwick

The Warwick Memorial Room in the headquarters of the American Society for Testing Materials, Philadelphia, was dedicated during a meeting of the Board of Directors held recently. The dedication consisted of the unveiling of an oil painting of C. Laurence Warwick and the mounting of two bronze plaques, the central tablet inscribed "This room is dedicated to the memory of C. Laurence Warwick who served the Society with distinction 1909-1942" and citing positions in which he served the Society.

Foundation for Education and Research Graduate Fellowship in Metallurgy

The A.S.M. Foundation for Education and Research has announced the establishment of a graduate fellowship in metallurgy to begin in September 1955. The primary purpose of this Fellowship in Metallurgy is to encourage qualified individuals who are working in industry or non-academic research to return to college to continue their studies in this field.

The following are the conditions governing the Award:

1. Applicant must have a bachelor's degree in metallurgy or some related field of science or engineering which qualifies him for graduate work in metallurgy.

2. Applicant must have had at least one year of experience in industry or nonacademic research since graduation, or must be so engaged with the expectation of completing at least one year before the fellowship becomes effective.

3. Applicant must be not over 27 years of age on Sept. 1 of the year in which the fellowship begins.

4. Candidate is free to select any college or university which offers graduate work in metallurgy. (Metallurgical engineering is considered synonymous with metallurgy.) The successful candidate must make his own arrangements for admission to the school.

5. Applications must be submitted on forms provided by the Foundation. Each application must be accompanied by the undergraduate scholastic record of the candidate and the names and addresses of two references. The applicant should also submit a statement in his own words, giving his reasons for wanting to undertake graduate work and describing a metallurgical subject or field of study which interests him as a subject for graduate research.

6. The amount of the fellowship will be $2400 for a single person and $3000 for a married man, marital status to be established as of Sept. 1 of the year the fellowship becomes effective. This will be accompanied by a grant to the school of $1200 for tuition and research expenses.

7. Applications are to be submitted not later than Feb. 1 of each year in which the graduate fellowship begins to the Secretary of the Foundation on forms provided for that purpose, accompanied by names of two responsible persons acquainted with his work and character, including one of a former professor.

8. Applications will be judged by committees appointed by the Trustees of the Foundation. On the basis of their recommendation, the Trustees will make the final decisions. All applicants will be notified of the outcome as soon as a decision is reached.

9. It is intended this fellowship would cover a full academic year, September through June.

Announcements of the fellowship program are to be sent to all chapter chairmen and will also be sent to heads of departments of metallurgy and other publicity outlets. **Application forms will be provided upon request by the Secretary of the A.S.M. Foundation for Education and Research, 7301 Euclid Ave., Cleveland 3, Ohio.** Only recommendations by individuals will be considered. Applications are due in Cleveland not later than Feb. 1 of the year the fellowship is to begin.

Three reviewing committees will be appointed by the president of the Foundation, each to consist of three or more persons (including teachers of metallurgy) who can conveniently meet together. Applications will be distributed among these three committees in such a way that no committee is asked to judge candidates whose first choice of school lies within the geographical area of the committee. Each reviewing committee will report to the Trustees before March 1, giving a list of applicants it considers eligible and naming the three candidates it considers outstanding.

A final reviewing committee of three shall be appointed by the president of the Foundation to select three candidates for submission to the Trustees so the Trustees may select the winner and an alternate for the Graduate Fellowship. The decision of the Trustees of the Foundation shall be final.

The secretary of the Foundation will notify the winning candidate who will be asked to signify his acceptance promptly. Information in regard to the award will be sent to the school selected by the winner but the winner will make his application and complete the details of his enrollment.

Upon due evidence of enrollment, the amount of the award will be transmitted to the school selected which will pay the recipient in regular installments.

Penn State Hears Practical Aspects of Physical Metallurgy

Speaker: E. S. Rowland

Timken Roller Bearing Co.

"Practical Aspects of Physical Metallurgy" was the subject of the speech delivered by E. S. Rowland, chief metallurgical engineer of the Steel and Tube Division of the Timken Roller Bearing Co., at a meeting of the Penn State Chapter. Dr. Rowland cited three examples to illustrate the close relationship between physical metallurgical research and industrial operations.

His first example was that of spheroidized annealing of high carbon steel. Speaking specifically of SAE 52100 steel, he stated that the industrial annealing treatment, especially for large pieces, was far from a simple application of the general textbook discussion of spheroidized annealing. Dr. Rowland stressed that such a commonly overlooked factor as the heating rate has been definitely proved to be critical.

Dr. Rowland's second example dealt with the effect of boron on case hardenability. This problem developed from the shortage of nickel. He stated that the effect varies with carbon content, quenching temperatures and the type of quenching. The effect is predictable, however. Furthermore, it was found that boron increases the hardenability of intermediate carbon steels and also, in these steels, it was also found that the multiplying factor is independent of the alloy concentration.

The final example was the matter of correlating the data of end-quench hardenability tests. These, he said, are very reproducible if sufficient precautions are observed. Some controls which should be exercised are in taking the hardness measurements, in controlling the time between removing the sample from the furnace and quenching it and in preventing drafts over the specimen during the quenching operation.— **Reported by W. Barry Collins for the Penn State Chapter.**

Austin Guest at Wichita

The National Officer's Night Meeting of the Wichita Chapter was combined with Past Chairman's Night. National President James B. Austin presented a talk on "Metals for Tomorrow", a talk which he has given over the past year to many A.S.M. chapters. — **Reported by Jonathan Ewert for Wichita Chapter.**

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1954 Preprint List

Papers for Presentation at the National Metal Congress, Chicago, Nov. 1-5, 1954

All of the following papers will be preprinted for distribution to members of the American Society for Metals upon request. The Society will print only 10% in excess of the number of orders for preprints in the office on press date, and this excess 10% will be sent out as long as it lasts. Order the papers by their numbers before August 15, 1954.

1. **The Aluminum-Vanadium Alloy System,** by O. N. Carlson, D. J. Kenney and H. A. Wilhelm, Institute for Atomic Research and Department of Chemistry, Iowa State College.

2. **Partial Phase Diagram of the Iron-Cerium System,** by James O. Jepson, Research Engineer, Jet Propulsion Laboratory and Pol Duwez, Professor of Mechanical Engineering and Chief of Materials Section of Jet Propulsion Laboratory, California Institute of Technology.

3. **The Titanium-Cobalt System,** by F. L. Orrell, Jr., Dow Chemical Co., and M. G. Fontana, Head, Department of Metallurgy, Ohio State University.

4. **The System Titanium-Aluminum-Manganese,** by R. F. Domagala, Associate Metallurgist and W. Rostoker, Senior Metallurgist, Research Department, Armour Research Foundation of Illinois Institute of Technology.

5. **The Tensile Characteristics of Unalloyed Zirconium at Low and Moderate Temperatures,** by J. H. Keeler, Research Laboratory, General Electric Co.

6. **Constitution of Ordering Alloys of the System Copper-Gold,** by F. N. Rhines, Professor of Metallurgy, W. E. Bond, Research Assistant, and R. A. Rummel, Laboratory Assistant, Metals Research Laboratory, Carnegie Institute of Technology.

7. **The Effect of Prestraining Under Different Stress States on the Fracture and Flow Properties of 2S-O Aluminum,** by I. Rozalsky, Research Associate, Metals Research Laboratory, Case Institute of Technology.

8. **Deformation Mechanisms in Polycrystalline Aggregates of Magnesium,** by F. E. Hauser, C. D. Starr, L. S. Tietz and J. E. Dorn, Minerals Research Laboratory, University of California.

9. **Tensile and Impact Properties of Low-Carbon Martensites,** by C. C. Busby and H. W. Paxton, Metals Research Laboratory, Carnegie Institute of Technology, and M. F. Hawkes, Quality Engineering Laboratory, U. S. Naval Ammunition Depot, Hawaii.

10. **The Influence of Chemical Composition on the Machinability of Rephosphorized Openhearth Screw Steel,** by E. J. Paliwoda, Research Engineer, Metal Research Division, Jones & Laughlin Steel Corp.

11. **The Influence of the Grinding Process on the Structure of Hardened Steel,** by W. E. Littmann, Research Metallurgist, Timken Roller Bearing Co., and John Wulff, Professor of Metallurgy, Massachusetts Institute of Technology.

12. **The Zonal Rolling Texture of Low Carbon Steel Cold Rolled at Various Temperatures,** by C. Nusbaum, Associate Professor of Physics, Case Institute of Technology and Consultant, Cold Metal Products Co., and W. Brenner, Jr., Metallurgist, Cold Metal Products Co.

13. **An Electron Metallographic Study of the Dependance of Microstructure on Hardenability,** by S. T. Ross, Project Engineer, R. P. Sernka, Research Metallurgist and W. E. Jominy, Chief—Metallurgical Research, Chrysler Corp.

14. **Calculation of Hardenability in High Carbon Alloy Steels,** by C. F. Jatczak and R. W. Devine, Jr., Research Metallurgists, Timken Roller Bearing Co.

15. **The Hardenability of Carbon Tool Steel,** by N. J. Culp, Metallurgical Department, Carpenter Steel Co.

16. **Effect of Carbon and Nitrogen on the Attainable Hardness of Martensitic Steels,** by A. E. Nehrenberg, P. Payson and P. Lillys, Research Laboratory, Crucible Steel Co. of America.

17. **Conditions for Dendritic Growth in Alloys,** by W. Morris, W. A. Tiller, J. W. Rutter and W. C. Winegard, Department of Metallurgical Engineering, University of Toronto.

18. **Stress-Corrosion Mechanism in a Magnesium-Base Alloy,** by D. K. Priest, Pfaudler Co., F. H. Beck, Assistant Research Professor, and M. G. Fontana, Professor, Department of Metallurgy, Ohio State University.

19. **Thermodynamics of Binary Interstitial Solid Solutions,** by R. Speiser, Associate Professor, Department of Metallurgy, and J. W. Spretnak, Associate Professor, Department of Metallurgy, Ohio State University.

20. **Influence of Substructure on the Shape of the Creep Curve,** by T. Hazlett and R. D. Hansen, Research Engineering Department, University of California.

21. **Further Study of Microstructural Changes on Tempering Iron-Carbon Alloys,** by B. S. Lement, Research Staff (Division of Industrial Cooperation), B. L. Averbach, Associate Professor, and M. Cohen, Professor of Physical Metallurgy, Massachusetts Institute of Technology.

22. **The Isothermal Transformation of Austenite Under Externally Applied Tensile Stress,** by S. Bhattacharyya and G. L. Kehl, Associate Professor of Metallurgy, Columbia University.

23. **The Elastic Limit and Yield Behavior of Hardened Steels,** by H. Muir, Senior Lecturer, Otago University, New Zealand, B. L. Averbach, Association Professor and Morris Cohen, Professor, Department of Metallurgy, Massachusetts Institute of Technology.

24. **Effect of Composition on Transverse Properties of Slack-Quenched Steel,** by J. Vajda and P. E. Busby, Metals Research Laboratory, Carnegie Institute of Technology.

25. **The Statistical Fatigue Properties of Lamellar and Spheroidal Eutectoid Steel,** by G. E. Dieter, Ordnance Corps, R. F. Mehl, Director, Metals Research

Relates Production to Tools and Dies

J. Y. Riedel (Right), Tool Engineer, Bethlehem Steel Co., Who Spoke on "Improving Production From Tools and Dies" at a Meeting in Boston, Is Shown With Major Robert C. Perron, Intelligence Officer, Watertown Arsenal, Coffee Speaker, and Sidney H. Baylor, Chairman of Boston Chapter

Speaker: J. Y. Riedel

Bethlehem Steel Co.

J. Y. Riedel, tool engineer of Bethlehem Steel Co., presented a talk on "Improving Production From Tools and Dies" at a meeting of the Boston Chapter. Mr. Riedel treated the subject in a positive manner, illustrating steps to be taken in the design and manufacture of tools to secure improved tool life.

Good tooling requires a combination of good tool design, sound toolsteel of the correct grade, proper heat treatment, good grinding practice and proper handling and use of the tools in service. In order to improve production from tools and dies it is necessary to determine which of these factors is the "weakest link" before a procedure for improvement can be planned.

Design factors which must be controlled to avoid failures of tools before they have worn out are sharp corners, re-entrant angles, extreme section changes, blind holes, keyways and compression overloads. Tapers are better than fillets on pneumatic tools. Prestressing to provide internal stresses opposite in direction to service stresses improves tool performance. Unloading notches decrease stress concentration and, generally, a series of notches is less damaging than a single notch. If tools usually wear out in service the design is adequate. The use of air hardening toolsteel permits the designer much wider latitude than when toolsteels requiring liquid quenching are used.

Carburizing of SAE-type SI toolsteel produces tools which combine extreme wear resisting surfaces with tough shock-resisting cores. Such tools outperform tools made of standard grades by conventional hardening procedure. Wear resisting steel such as high-carbon high-chromium SAE-type D2 can also be improved by carburizing before hardening for some applications. Nitriding and cyaniding are useful in improving the wear resistance of some types of tools. Short cycle hardening of high-carbon high-chromium toolsteels, involving a high-temperature quench plus a transformation temper, often provide increased wear resistance. Differential hardening of some tools improves tool performance. Many tools can be salvaged for further service by rehardening to regain worn dimensions or rehardening to produce a new chill on carbon steel water hardening tools.

The effect of stresses generated by grinding and methods of either using or avoiding these stresses were discussed. The direction of grinding scratches and removal of the "featheredge" from ground edges were considered to be important.

Maintaining proper clearances on tools is one of the most important operating factors. Control of the stroke to avoid unnecessary wear is necessary and proper feeding of stock must be maintained.

Slides showed production applications of the factors discussed. The speaker closed with a challenge that the performance of any tool can be improved if the expenditure of time, effort and money is warranted.—**Reported by Richard A. Pomfret for the Boston Chapter.**

Laboratory, and G. T. Horne, Metals Research Laboratory, Carnegie Institute of Technology.

26. **Effect of Static Stress on the Damping of Some Engineering Alloys,** by A. W. Cochardt, Metallurgy Department, Westinghouse Electric Corp.

27. **The Effect of Cold Work and Recrystallization on the Formation of the Sigma Phase in Highly Stable Austenitic Stainless Steels,** by A. J. Lena, Associate Director of Research, and W. E. Curry, Chief Metallographer, Allegheny Ludlum Steel Corp.

28. **The Laves and Chi Phases in a Modified 12 Cr Stainless Alloy,** by F. L. VerSnyder and H. J. Beattie, Jr., Thomson Laboratory, General Electric Co.

29. **Austenitic Chromium-Nickel Steels Containing Nitrogen,** by R. Franks, Manager, W. O. Binder and J. Thompson, Technical Service and Development Department, Electro Metallurgical Co.

30. **The Effect of Deformation on the Martensitic Transformation in Austenitic Stainless Steels,** by H. C. Fiedler, Research Laboratory, General Electric Co., B. L. Averbach, Associate Professor, and M. Cohen, Professor, Department of Metallurgy, Massachusetts Institute of Technology.

31. **The Role of Water Vapor and Ammonia in Case Hardening Atmospheres,** by P. A. Clarkin and M. B. Bever, Department of Metallurgy, Massachusetts Institute of Technology.

32. **Secondary Graphitization of Quenched and Tempered Ductile Cast Iron,** by J. C. Danko and J. F. Libsch, Department of Metallurgy, Lehigh University.

33. **A Method for Determining the Continuous Cooling Transformations in Steel,** by R. D. Chapman, Research Metallurgist, and W. E. Jominy, Chief—Metallurgical Research, Engineering Division, Chrysler Corp.

34. **Elevated Temperature Properties of Ductile Cast Irons,** by C. R. Wilks, Metallurgist, N. A. Matthews, Assistant Chief Metallurgist, and R. Wayne Kraft, Jr., Metallurgist, American Brake Shoe Co.

35. **Effect of Cold Work on the High-Temperature Creep Properties of Dilute Aluminum Alloys,** by R. E. Frenkel, Research Engineer, Oleg D. Sherby, Research Engineer, and John E. Dorn, Professor of Physical Metallurgy, University of California.

36. **Creep-Tempering Relationships in Hardened 4.5% Chromium Steels,** by E. C. Roberts, Assistant Professor of Metallurgy, Montana School of Mines, N. J. Grant, Associate Professor of Metallurgy, and Morris Cohen, Professor of Metallurgy, Massachusetts Institute of Technology.

37. **The Strength of Wrought Zirconium-Base Binary Alloys at 1800 to 2200° F.,** by H. A. Saller, J. T. Stacy and S. W. Porembka, Battelle Memorial Institute.

38. **Effects of Cold-Work on Cementite in Steel,** by D. V. Wilson, Lecturer, Department of Industrial Metallurgy, Birmingham University, England.

39. **Effect of Heat Treatment Upon Microstructures, Microconstituents and Hardness of a Wrought Cobalt-Base Alloy,** by J. W. Weeton and R. A. Signorelli, Lewis Flight Propulsion Laboratory, N.A.C.A.

Western Ontario Features Die Casting Talk

D. Fry, Sales Manager of the Schultz Die Casting Co., Presented a Talk Entitled "Use of Die Castings" Before a Recent Meeting of the Western Ontario Chapter. Shown at the meeting are, from left: T. Heard, recently elected Chapter chairman; Mr. Fry; P. Banwell, Walker Metal Products Ltd.; T. Carson, James Carson & Sons Machinery Co. Ltd.; and F. Floyd. (Reported by C. G. Robinson for the Western Ontario Chapter)

Continuous Casting Topic at Detroit's Young Fellows Night

Speaker: Isaac Harter, Jr.
Babcock & Wilcox Co.

The Young Fellows Section of the Detroit Chapter climaxed the 1953-54 season with a Young Fellows Night meeting. This group, composed of members under 36 years old, has shown active progress in furthering the interests of the Chapter during their first year.

The "Continuous Casting Process for Steel" was described by Isaac Harter, Jr., chief engineer in charge of the project at the Babcock & Wilcox Co. Mr. Harter gave a brief history of the continuous casting process to date. He pointed out that as materials, equipment and methods improved, the continuous casting of nonferrous metals became a commercial reality. By 1947 only the problems inherent to handling molten steel (higher pouring temperatures and greater heat capacity, etc.) remained to be solved to make the process successful.

The Republic Steel Co., cooperating with Babcock & Wilcox, put a pilot plant into operation at Beaver Falls, Pa., early in 1946. Since then over 1500 tons of steel have been processed into various articles and a total of about 5000 tons has been cast. Mr. Harter pointed out the economics of the process with several examples. By eliminating ingot casting, reheat furnaces, soaking pits, blooming mills and some scarfing loss, use of the process allows substantial savings in operation, equipment and maintenance. Plants making steel by this process can be smaller and located near their customers, and freight costs and capital investment would be much lower. Economical flexibility in changing from one kind of steel to another suited to customers' demands may be made.

It has been found essential to have some type of holding unit to coordinate the supply and consumption of metal between the melting and the casting plant. Babcock and Wilcox has built and tested a 5-ton experimental unit. Its holding ladle is similar to a conventional ladle, it is transportable, and the steel is tapped at the proper temperature by heating with single-phase arcs, and stirred electromagnetically.

The pilot process begins with steel scrap charged into a 7-ton electric-arc furnace. The charge is melted and brought to the desired analysis, then poured into a tun dish containing inverted wires to hold back any slag as the metal flows into the mold cavity. This mold is made of brass ¼ in. thick and surrounded by a water jacket. Water flows through the jacket at a mile-a-minute rate. The mold must be clean to prevent "wetting" by the steel. An inert atmosphere over the cavity is formed by injected gas and oil. As a shell or envelope of solid metal is withdrawn from the bottom of the mold by a leader bar the solidified casting passes through guide rolls which support the casting and prevent internal tears. As the casting continues the solid bar passes down through pinch rolls which control the rate of descent. The speed of these rolls in turn is controlled by a patented X-ray "seeing-eye" placed in position to indicate the liquid level. Below the pinch rolls a parting operation begins. A cutting torch is attached to the continuously dropping bar and rides down as it cuts through the bar. The freed length of bar drops into a lowering trough which lays it horizontally onto the rollers at ground level.

The steel is formed at the rate of 60 in. per min. for high carbon steel or stainless, and at 100 in. per min. for low carbon grades. Oval bars measuring 4½ x 9 in. in cross section are most practical for rolling. This shape can be rolled into a 4-in. square billet in one pass.—**Reported by C. R. Biddick for Detroit.**

Stress Analysis as Tool For Machine Designer

Speaker: A. H. Pickford
Caterpillar Tractor Co.

A. H Pickford, research engineer from Caterpillar Tractor Co., recently gave a talk before the Notre Dame Chapter on the "Application of Experimental Stress Analysis to Machine Development".

The principal tools for this work consist of "Stress-Coat" and wire strain gage. Mr. Pickford explained that Stress-Coat is used to find the area of principal stress and its direction, and strain gages are used to find the magnitude of the stress. The two methods were very thoroughly explained.

After the most promising machine designs are settled on, they are fatigue tested, after which the best heat treatment, surface finish, etc., are determined.

Mr. Pickford showed slides of the development of crankshafts and connecting rods through the laboratory tests, motor and field testing.

For dynamic testing, oscilloscopes and oscillographs are used to pick up the stress signals from the strain gages.—**Reported by R. C. Pocock for Notre Dame Chapter.**

was organized in 1913 in Detroit.

Government Offers Course in Economic Mobilization

Industrial College of Armed Forces Extends Opportunity to Study National Strategy and Resource Mobilization by Correspondence

The problems involved in the emergency management of the national economy demand thoughtful consideration of United States citizens as a continuing effort, rather than as a matter for mere planning for action at an indefinite time, according to Rear Admiral W. McL. Hague, commandant of the Industrial College of the Armed Forces.

As members of the largest group of metals engineers in the world, it seems that we might properly subscribe to the Admiral's thesis with more than just an agreeing nod. A.S.M. helps our government on a broad front in its engineering for both peace and national defense. A.S.M. members are constantly on the front line of research and development. So, we might—many of us should—accept it as our set of rules for action, and then do something about it.

What are the problems and how does the Industrial College extension study help us as individuals to strengthen our national security?

In any national emergency there is always a shortage of leadership. Moreover, our need for leadership is multiplied whenever full mobilization is forced upon us. Thus, it is logical for us to prepare for leadership needs before we must face the serious emergency for action.

What the Course Covers

Five areas of vital importance in our age of international peril should be better understood and should receive our wholehearted support. True enough, these problems do not face us *now*, but they are inevitable conditions in times of crisis and America should be able to call upon thousands of us for the best possible performance in key positions.

1. Economics. Principles of administration in time of complete mobilization.

2. Natural resources. What they are and where. Resources of manpower, manufacturing, transportation, communications and technology.

3. Mobilization of these resources. Determining requirements, procurement for both military and civilian needs, distribution logistics.

4. Foreign relations. How they affect national security. History, policy objectives, operation of aid programs.

5. Managing the national economy in an emergency. Emergency powers of the Executive, stabilizing the economy, reconversion, evaluation of mobilization experience.

Aims of the Course

The purpose of the correspondence course is to extend the facilities of the College to those who cannot receive instruction in the resident course, and who in an emergency may serve in key positions in the military, in government or in the civilian economy. It is intended in general to assist in the development of a better informed leadership in the field of programming in support of national objectives and more effective management of mobilization.

Purpose of the College

According to its charter, approved by the Secretary of Defense and issued by the Joint Chiefs of Staff, the purpose is: To prepare selected officers of the armed forces for important command, staff, planning assignments in the Department of Defense, and selected civilians, such as we find in great numbers among A.S.M. membership, for important industrial mobilization planning assignments in any government agency.

Who May Take the Course

The first responsibility of the Industrial College of the Armed Forces is, of course, to up-grade and give specialized training to members of the armed forces, both active and inactive. Enrollment is open to regular, reserve and national guard officers, with the grades of Major or Lieutenant Commander or higher. Civilians of government agencies are eligible who have a status comparable with the above-named commissioned officers.

Also eligible for the correspondence course are executives of industry, educators and prominent citizens who in an emergency may serve in comparable positions in government or in the civil economy. It is desired that applicants of civilian status meet one or more of the specific criteria listed below:

A. Hold an important civilian position in some field of endeavor which would contribute toward the national objective in time of emergency.

B. Have a mobilization assignment to a major command, or to an organization directly concerned with economic mobilization.

C. Have attended a national resources conference conducted by the Industrial College of the Armed Forces.

D. Have completed major courses of high level in their own field.

E. Have a college education or the equivalent.

F. Have attained important command, staff or operational assignment.

TO A.S.M. Members: Many of you are looking forward with pleasure to more details about the Technical Societies Congress in Europe from June 1-19, 1955. If you wish to be immediately informed on additional plans as they develop for the technical program and the planned visits, then send your name to A.S.M. headquarters and request to be placed on the mailing list to receive information about "A.S.M. to Europe in '55".

Instructional Material

All text and instructional materials are provided by the College. Newly revised texts are now ready for use. They are organized into small volumes and grouped according to the previous listing of the five areas. All instructional material may be retained by the student.

Time Required

A total of 51 weeks is suggested, but is flexible to accommodate those who have a relatively large amount of free time, or those whose responsibilities allow for less free time.

An examination is required after the completion of each volume. It serves two functions—as a learning and review device and as a means by which the student may know "how well am I doing".

A member of the college staff will be designated to answer questions and otherwise assist each student. A certificate of completion is awarded by the college to every student who satisfactorily completes the course.

A total of 48 credits has been authorized by the military service for members of the armed forces who complete the correspondence course.

Where To Apply

Applications for enrollment in the Industrial College of the Armed Forces Correspondence Study should be sent to:

Commandent, Industrial College of the Armed Forces
Attn: Correspondence Study Branch
Fort Lesley J. McNair
Washington 25, D. C.

Traces Gas Turbine Development and Uses

James A. Kearney (Left), Recently Elected Chairman of the New Jersey Chapter, Presents a Certificate to the Speaker, Norman Mochel, Westinghouse Electric Corp., Who Presented a Talk on "Gas Turbine Development"

Speaker: Norman Mochel
Westinghouse Electric Corp.

The New Jersey Chapter heard Norman Mochel discuss the "Development, Uses and Metallurgy of Gas Turbines" at the last meeting of the season.

In an unusually interesting talk, illustrated with excellent slides, Mr. Mochel pointed out that the gas turbine is a relatively recent development but is, in essence, not greatly different from the steam turbine, which in its earliest and simplest form goes back to 130 B.C. Designers of gas turbines have drawn heavily from experience gained from long-time use of steam turbines. England and Switzerland currently lead the world in gas-turbine development.

Gas turbines range from small superchargers to huge central station units developing up to 27,000 kw. Unless power to run a compressor is supplied from a separate source, about 2/3 of the energy developed by the gas turbine is used to compress air, leaving only about 1/3 available for useful work. Nevertheless, where cheap fuel is available, the gas turbine is used extensively. Because it requires no water for cooling purposes and is readily adapted to bleed fuel directly from an oil or gas line, the gas turbine is often installed in a pumping station or power generating unit, especially in remote and relatively inaccessible locations. Of the total number of gas turbines in use, exclusive of those in aircraft and naval installations, 45% are in the gas and petroleum industry and 35% in central power generating stations.

Mr. Mochel stated that, in his opinion, development of the gas turbine has been retarded far less by metallurgical problems than by design problems associated with the compressor. The combustion chamber requires no special alloy because its walls are cooled by the incoming cold air.

Because of the higher temperatures involved in gas turbines, rotors are composed of multiple disks bolted together, whereas the steam turbine has a one-piece rotor. Gas turbine blades are similar in shape to those used in steam turbines but are made of alloys that will withstand higher temperatures. Many such alloys are not forgeable and precision cast blades are often used. Many problems are involved in the joining of the blades to the rotor by welding or brazing. In the design of gas turbines the four principal factors are operating temperature, useful life, stress and allowable deformation. — **Reported by R. A. Grange for New Jersey.**

Hard Facing Materials Subject at Minnesota

Speaker: G. A. Fritzlen
Haynes Stellite Co.

The Minnesota Chapter heard G. A. Fritzlen, assistant technical director of the Haynes Stellite Co., speak on "Hard Facing Materials", particularly materials applied by welding over cheaper base materials for heat and wear resistance. Abrasion or corrosion resistance, or both, can be high through various temperature ranges and may be balanced according to cost and requirements.

Hard facing materials fall under four classes, according to Mr. Fritzlen: (1) Cast irons and steels with total alloy content under 20%; (2) Stainless-type steels with over 20% alloying elements; (3) Nonferrous alloys of cobalt, nickel and copper; and (4) Diamond substitutes, such as tungsten carbide.

Nickel-chromium-molybdenum alloy surfacing permits the hot piercing of steel at 1700 to 1900° F. with the service lives of punches and dies being increased more than three times. Hard facing alloys multiply the life of airplane engine valves and seats up to 20 times. They may increase the life of plowshares and planter openers as much as 50 times.

Hard surface materials are applied locally by shielded gas welding or with multiple-jet oxy-acetylene burners and over wide areas by submerged melt and electric arc-welding methods. Discussion indicated great possibilities for the new metalloid and metal-ceramic materials. —**Reported by Knox A. Powell for Minnesota Chapter.**

Construction of the Kenny Dam Described at San Diego

Speaker: Thomas Allen
Construction Engineer

The Past Chairman's Night meeting of the San Diego Chapter featured an illustrated talk on the "Construction of the Kenny Dam in British Columbia". The dam was built by the Aluminum Co. of Canada to develop water power for generating 2-million horsepower in electricity for the reduction of bauxite. Many phases of the dam and generator station were explained by Colonel Thomas Allen, construction engineer on the project, and illustrated by excellent color slides taken by Col. Allen and his wife. A motion picture of the aluminum industry supplied by the Aluminum Co. of America supplemented Col. Allen's talk.

Many of the past chairmen of the San Diego Chapter were present at this meeting, including the first chairman, and Past Chairman certificates were presented to J. C. Thompson and G. W. Hardy.—**Reported by L. J. Hull for San Diego.**

Protective Treatments Is Subject of Wichita Meeting

The Wichita Chapter heard Hugo A. Barbian of the technical service and development division of Dow Chemical Co., give a talk on "Protective Treatments on Magnesium and Shop Handling" at a recent meeting. The meeting was attended by approximately 60 members and guests. —**Reported by Jonathan Ewert for Wichita Chapter.**

Cites Uses of High-Strength Steel in Prestressed Concrete

Speaker: W. O. Everling

American Steel & Wire Division
U. S. Steel Corp.

The Cleveland Chapter heard W. O. Everling, director of research, American Steel & Wire Division, United States Steel Corp., speak on "High-Strength Steel in Prestressed Concrete" at a recent meeting.

Mr. Everling introduced the Chapter to the relatively new field of the use of high-strength steels in prestressed concrete. He stated that if concrete is compressed before the working load is applied, advantage can be taken of the fact that the compressive strength of concrete is many times greater than its tensile strength. It has been proven that the weight of a prestressed concrete beam will be approximately ½ that of a conventionally reinforced concrete beam.

At first, compression was attempted by casting monolithic beams with precast longitudinal holes through which conventional reinforcing bars were inserted. Compression was accomplished with a suitable tightening arrangement on the ends of the steel bars. These first tests were unsuccessful because the shrinkage of the concrete, due to curing and the sustained high compressive stress, amounted to more than could be taken care of by the elastic stretch of conventional reinforcing bars. In the 1920's a Frenchman, Freyssinet, discovered that the clue to successful prestressed concrete must rest in the use of very high-strength steel tensioning members. In that case, the elastic stretch was found to be enough to take care of the shrinkage in the concrete. The method practiced by Freyssinet is called post-tensioning, in that a concrete beam is cast first with suitable longitudinal holes through which the high-strength steel is inserted for final compression.

At about the same time another European, Hoyer, invented the pretensioning method, which consists of tensioning small high-strength wires first, then casting the concrete around the the wire and allowing it to bond with it. Upon curing, the end anchorages of the wire are released and a small portion of the elastic stretch of the wire used to compress the concrete.

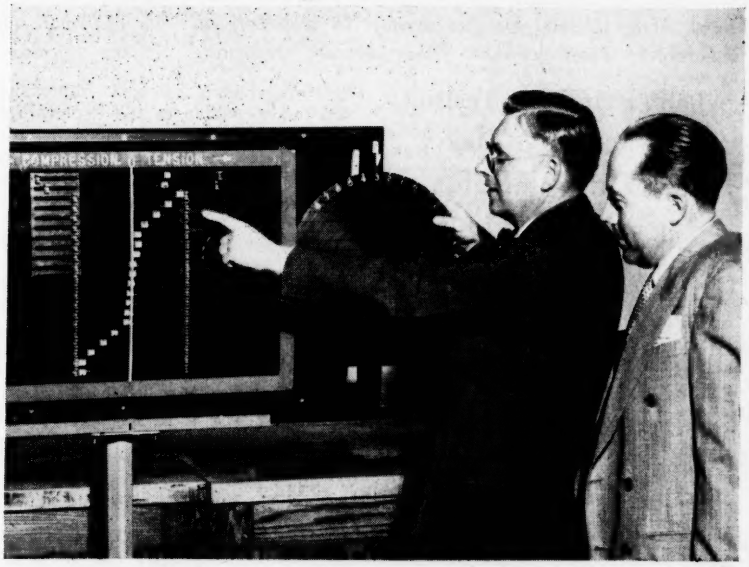
Mr. Everling illustrated with slides how creep or relaxation in high tensile strength wire varies with time. Curves were shown to illustrate the difference between the behavior of wire in the hard drawn and in the stress relieved state.

The amount of wire that is to be placed in a prestressed concrete beam may be determined by the desired mode of failure. Generally speaking, the larger the amount of wire used, the more load it will take to cause ultimate failure; however, if an excessive amount of wire is used, ultimate failure will be extremely sudden without a normally desired large deflection prior to failure. A typical prestressed concrete beam, 60 ft. long and 30 in. high, may have 8 groups (12 strands per group) of prestressing wire, representing a total compressive force of 400,000 psi.

At the present time, a joint committee of the American Concrete Institute and the American Society of Civil Engineers are involved in writing a code for prestressed concrete. This job is an interesting one because such a code must not be restrictive with respect to the ingenuity of practicing engineers, while at the same time it must be sufficiently safe to guard against failures.

Prior to Mr. Everling's talk, a coffee talk was given by Oliver Henderson, representative from Ohio Bell Telephone, on "Use of Miniature Components in Telephone Systems". Mr. Henderson described new developments in the field of electrical equipment as applied to telephone systems. He emphasized the miniaturization of parts that is taking place in the industry. He indicated that eventually we will be able to dial to nearly all points within this country. At the present time, the Bell Telephone Laboratories are working on projects, which, when fully developed, will unbelievably change our way of life.—**Reported by R. M. Baker for Cleveland.**

Indiana Chapters Meet at Purdue



Shown Demonstrating a Point Made in His Talk During Indiana Chapters' Sixth Annual Spring Symposium Is Raymond L. Mattson, General Motors Research Laboratory, Who Spoke on "Practical Solution of Residual Stress Problems". Speaker E. S. Rowland, Timken Roller Bearing Co., looks on

The Calumet, Fort Wayne, Indianapolis, Muncie, Notre Dame, Purdue and Terre Haute Chapters A.S.M. presented their 6th Annual Spring Symposium at Purdue University, with the Purdue Chapter as host. Subject of the symposium was "Residual Stresses". Guest societies were the Indiana Sections of S.A.E. and S.E.S.A.

Technical chairman of the meeting was Walter E. Jominy, and guest speakers included: Charles Lipson, consultant, whose subject was "Fundamentals of Residual Stresses"; E. S. Rowland, chief metallurgical engineer, Timken Roller Bearing Co., who talked on "Measurement of Residual Stresses"; and Raymond L. Mattson, assistant head of the engineering mechanics department, General Motors Research Laboratory, who discussed the "Practical Solution of Residual Stress Problems". Dr. Jominy concluded the symposium with a summary.—**Reported by Leonard J. Ewalt for Purdue Chapter.**

● was the sole sponsor of the first World Metallurgical Congress when 510 Overseas Conferees from 39 free nations of the world conferred with American conferees during the annual convention of the ● in Detroit in 1951.

Wyzalek Awards Presented in New Jersey

The Wyzalek Memorial Awards of the New Jersey Chapter Were Presented During a Recent Meeting. These awards, inaugurated in 1943 in memory of John F. Wyzalek, past chairman of the Chapter, are presented annually to students in the vocational or technical high schools for proficiency in metallurgical laboratory investigations. The awards, consisting of a first and second prize for each school, were given to 16 young men representing eight schools in the Northern New Jersey Area. Shown with the winners in the first row, center, are Norman Mochel, guest speaker at the meeting, and W. Hughes White, Chapter chairman. (Reported by Herbert Dobkin, Chairman of the Vocational and Technical Schools Committee)

Schaefer Outlines Testing And Inspection of Heavy Forgings at Washington

Speaker: A. O. Schaefer
Midvale Co.

The Washington Chapter's National Officers' Night meeting featured A. O. Schaefer, vice-president of the Midvale Co., and national trustee A.S.M., who gave an extremely interesting talk on "Inspection and Testing of Heavy Forgings". The talk was illustrated with pictures of large steel forgings.

Heavy steel forgings are not in mass production; each is a carefully tailored product with its own problems. Even steel compositions are not standard. The final properties are all-important, and each forging calls for skill and experience in avoiding or in positioning the possible sources of weakness. Every item, whether gun barrel, roll, turbine or generator rotor, must be carefully tested at many stages and the final product becomes the subject of an extensive set of records. This is important because experience forms the basis for good forging practice.

The tests that are made should be truly characteristic of the forgings, and must be properly selected from the forging itself. However, the need for tests and test metal must not be allowed to interfere with good forging practice. The tests used include the tensile, bend and impact, macro-inspection, Brinell and scleroscope hardness, magnaflux and bore searching (with a boroscope).

The science of ultrasonics has supplied one of the newest tools of inspection which has become important and indespensable in the exploration of forgings for undesirable conditions hidden below the surface. An important and elaborate inspection is the heat indication test. The forging, no matter how large, is mounted in a heating furnace, rotated around its axis, and indicated. Deviations from straightness as heating and cooling occurs are permitted to only 0.001 in.

The rules for production of good, heavy steel forgings are summarized as: Proper melting and pouring practices; satisfactory heating cycles and temperature control during forging and subsequently; and adequate mechanical working.—**Reported by H. E. Stauss for Washington Chapter.**

What Industry Expects From Young Engineers Theme at Virginia Tech

Speaker: John T. McCormack
Reynolds Metals Co.

At a special meeting of the Virginia Polytech Chapter held in conjunction with Engineering Emphasis Week at Virginia Polytechnic Institute, John T. McCormack, metallurgical consultant, Reynolds Metals Co., presented a discussion on "What to Expect and What Industry Expects From the Engineer".

When a problem is given an engineer, he is responsible for its solution as well as an evaluation of his findings. When a solution is not attainable, the engineer must be frank in admitting his shortcomings, or be prepared to suggest what is further needed for the proper solution of the problem.

During the first year of employment, a company invests a lot in its young engineers, with very little return expected. However, the company does expect a new employee to be grounded in engineering knowledge, even though his performance as an individual has not yet been evaluated.

Of greatest importance to the young engineer is his ability to get along with people in all fields of endeavor. He is of little value if he cannot "sell" his product to someone. It is important that the young man start out in a job he likes to do, even though the pay might not be up to what he thinks he's worth. Location of the job is a consideration for the engineer just starting on his career. A good rule of thumb in choosing between two or more jobs is to accept the one he would like best if there were no pay question involved. The man who likes his job will have little difficulty in adjusting to the other elements which combine to make a happy life.

Although psychology and sociology have their place in the young engineer's background, common sense will go a long way in helping him to climb the ladder of success. A thorough knowledge of the English language is of primary importance to the engineer. If he cannot compile his data and present it properly, he is a poor company risk.

The engineer of today must continually broaden his knowledge in his own and in other fields as well. He should be broad minded and able to recognize the worth of people in fields of endeavor differing from his own.—**Reported by E. C. van Reuth for Virginia Polytech Chapter.**

New Films

Die Casting

The American Zinc Institute is producing a motion picture on "Die Casting" which will be available for distribution after Oct. 1, 1954. The film will be 16-mm. Kodachrome with sound, requiring 30 min. to show and will be educational and completely noncommercial. It will define the die casting process, show range of sizes currently possible and list uses, compare die casting and other production methods, survey the alloys used, present a thorough examination of the machine, die and auxiliary operations, and give case histories of outstanding applications. Write directly to: Ernest W. Horvick, American Zinc Institute, 60 East 42nd St., New York 17, N. Y.

Productive Maintenance

A 25-min. production entitled "Productive Maintenance" which dramatizes the concept and 5-step plan of productive maintenance and shows industry how to get the most productivity out of existing facilities, was produced for the General Electric Co. by Wilding Picture Productions, Inc. Further information about this film may be obtained by writing to: General Electric Co., News Bureau, Schenectady 5, N. Y.

Resistance Welding of Stainless Steel

The Resistance Welder Manufacturers' Association has announced they now have a film available for distribution entitled "Resistance Welding of Stainless Steels." The film, prepared by the Allegheny Ludlum Steel Corp., covers the various types of equipment used, the proper handling of stainless steels prior to welding, the different weld joints made and the precautions to be observed if the excellent properties of stainless are to be present in the finished product. Requests for this sound, color, 16-mm., 21-min. film should be made through the Association's Headquarters, 1900 Arch St., Philadelphia.

Solar Energy Symposium

A World Symposium on "Applied Solar Energy" will be held from Jan. 12 through 15, 1955, under the leadership of the Stanford Research Institute. Headquarters for the symposium will be the Westward Ho Hotel, Phoenix, Ariz.

The four-day meeting of leading world scientific and industrial interests in solar energy utilization will attempt to evaluate present knowledge in terms of practical applications. Special sessions will be devoted to the potential use of solar energy to solve problems of individual industries.

Ladies Travel to Pakistan Via Inland Empire Meeting

Speaker: John P. Spielman
State College of Washington

The Ladies Night Meeting of the Inland Empire Chapter featured a travelogue on "Pakistan", narrated by John P. Spielman, dean of the School of Mines of the State College of Washington, and illustrated with slides taken by the Dean when he was making an educational survey of Pakistan for the Foreign Operations Administration.

Dean Spielman described the American University in Beirut, the interesting city of Karachi which has over a million inhabitants, the building of a university at Peshawar in the Northwest Province, the Khyber Pass and city of Lahore. He discussed educational, agricultural and transportation facilities noted on his journey.—**Reported by F. R. Morral for Inland Empire.**

Denver Section Hears Austin

James B. Austin, A.S.M. national president and director of research laboratories, U. S. Steel Corp., spoke on "Metals of Tomorrow" before a meeting of the Denver Section of the Rocky Mountain Chapter.

Since Dr. Austin has presented this same speech before many of the A.S.M. chapters during the course of the year, it will not be repeated here.—**Reported by Eugene Jiannetti for Rocky Mountain.**

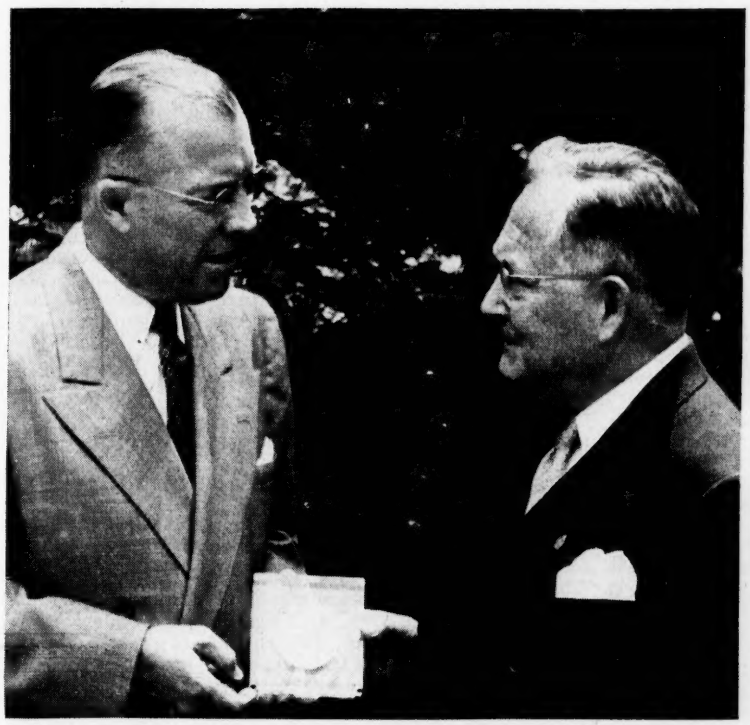
Mahoning Valley Visits United Eng. & Foundry Co.

Members of the Mahoning Valley Chapter visited the New Castle, Pa., plant of the United Engineering and Foundry Co. on a tour of inspection recently. Dinner was served at the plant cafeteria prior to the tour.

The trip consisted of an inspection of the machine shop, the pattern shop and the steel foundry. Regular production at the plant includes complete strip, blooming, rail, structural, plate, billet, sheet, bar and slabbing mills, forging presses, shears, lathes, saws and welding equipment.

The plant also has facilities permitting the manufacture of extremely large machinery or castings. Some of the world's largest castings have been made in the foundry, among them two steel press housings weighing 472,000 lb. each.—**Reported by John D. Anderson, Jr., for Mahoning Valley Chapter.**

Receives Penn State Alumnus Award



William B. Wallis (Right), President of the Pittsburgh Lectromelt Furnace Corp., Is Shown Receiving the Distinguished Alumnus Award of the Pennsylvania State University From Milton S. Eisenhower, President of the University. The purpose of the award is to recognize and salute an outstanding alumnus whose personal life, professional achievements and community service exemplify the objectives of the University

Discusses Cold Forming of Steel

Darwyn I. Brown (Left), Koldflo Division, Mullins Manufacturing Corp., Who Spoke on the "Cold Forming of Steel—the Mullins Koldflo Process" at a Meeting of the Mahoning Valley Chapter, Is Shown Above With John W. Holzworth (Center), Salem-Brosius Inc., Technical Chairman, and John D. Anderson, Jr. (Right), Youngstown Sheet & Tube Co., Publicity Chairman

Speaker: Darwyn I. Brown

Koldflo Division
Mullins Manufacturing Corp.

Darwyn I. Brown, market development manager of the new Koldflo Division of Mullins Manufacturing Corp., addressed the final dinner meeting of the 1953-1954 season of the Mahoning Valley Chapter on the "Cold Forming of Steel—the Mullins Koldflo Process". Mullins Manufacturing Corp. has been responsible for much of the important development work in cold extrusion in recent years and has extruded more pieces than any other concern in the world.

According to the speaker, a 1012 steel, aluminum killed and hot topped, is the type mainly used in this method of manufacture. He listed three principal requisites for successful cold extrusion:

1. The Quality of the Metal—Steel defects are extremely detrimental, thus requiring close inspection by the steel producer.
2 Die Design
3. Lubrication—The usual procedure is to wash and pickle, bonderize and then soap. The lubricant must be capable of withstanding extrusion temperatures of 300 to 400° F.

Extrusion can be carried on until hardness reaches a value of about Rockwell B-98 and then an annealing operation must be carried out prior to additional cold work. The usual hardness range of a finished piece is in the Rockwell B-90's; yield strength is about 95,000 psi.

The principal peacetime commercial application at the present time is the manufacture of cylinders for fluid power requirements such as hydraulic pumps for automobile power brakes. These parts were formerly made from seamless tubing. Manufacture by extrusion requires a cap on one end only on the cylinder and, in addition, provides a rounder and straighter piece.

One of the principal future possibilities lies in the field of accumulators. An accumulator is a hydropneumatic cylindrical device for storing power. A main use at the present time is a battery substitute for the starting of large diesel engines. A possible application to automobiles is foreseen by the speaker in the next two years, since the manufacturing cost can be appreciably reduced by cold extrusion.—**Reported by John D. Anderson, Jr., for Mahoning Valley Chapter.**

Research on Diffusion Explored at Oak Ridge

Speaker: B. H. Alexander

Sylvania Electric Products, Inc.

The Oak Ridge Chapter recently heard a talk on "Diffusion" given by B. H. Alexander of Sylvania Electric Products, Inc.

Dr. Alexander presented an outline of past research in solid state diffusion, from the time of the first observations by Faraday in 1820 on powder mixtures of copper and zinc up to the present work that has been stimulated by Kirkendall's investigation of unequal diffusion in alpha brass. Most of the older effort was directed toward determining the requirements for diffusion and measuring the constant of the characteristic exponential equation. Mechanisms of diffusion were considered secondarily.

Since 1940, more and more attention has been given toward a better understanding of the mechanism of diffusion. In this regard, Dr. Alexander described his own research on uneven diffusion rates, void formation and dimensional changes resulting from diffusion. He pointed out that a study of the mechanism of diffusion is a study of imperfections in solids. One theory that explains the Kirkendall effect and the development of porosity during diffusion postulates an equilibrium number of "vacancies" in the lattice together with dislocations as a source or sink for vacancies. If an excess of vacancies develops during diffusion they may precipitate as holes or voids. This effect, when pronounced, may lead to errors in the measurement of diffusion coefficients. Another explanation of uneven diffusion rates, which was favored by Dr. Alexander, is based on the fact that interstitial atoms, as well as vacancies, are involved. This uneven diffusion sometimes produces an odd expansion in powder compacts of two components and may lead to microcracking in the homogenization of castings which show dendritic segregation.

Dr. Alexander pointed out that diffusion is of major importance in practical metallurgy. Using several slides, he discussed the role of diffusion in such processes as spheroidization, powder metallurgy, intermediate phase formation, sintering in the presence of a liquid and rhythmic (or Liesegang) precipitation.

He also described briefly the present research on diffusion in semiconductors and the relation it has to imperfections such as vacancies, interstitials and dislocations. — **Reported by James Scott for Oak Ridge Chapter.**

Discusses Metallizing at Meeting of Akron Chapter

Speaker: R. J. McWaters

Metallizing Engineering Co.

The last meeting of the Akron Chapter's 1953-54 reason featured a talk by R. J. McWaters, sales manager of the Metallizing Engineering Co., on the subject "Metallizing". Mr. McWaters used a 16-mm. film on metallizing to illustrate his excellent talk.

John Botts, secret service officer operating out of the Summit County prosecutor's office for the last ten years, presented an interesting coffee talk on "Narcotics".

The meeting concluded with the election of new Chapter officers for the coming season. — **Reported by Richard E. Miller for Akron.**

Future of Titanium Topic at Cleveland

Speaker: T. W. Lippert

Titanium Metals Corp.

The Cleveland Chapter heard T. W. Lippert, manager of sales and technical service, Titanium Metals Corp., speak on "Outlook for Titanium" at a recent meeting.

Mr. Lippert's opening comments indicated that the titanium mills are attempting to catch up with the mechanical properties originally publicized from tests on laboratory heats. The first method of producing titanium commercially at a reasonable cost was developed by W. J. Kroll, and was prompted by pressure for military use shortly after the last war. This process involves treatment of ore briquettes with chlorine and reduction of the resultant tetrachloride with magnesium.

The government objective is for industry to produce 22,000 tons in 1955 and aim for 35,000 tons capacity by 1957.

Production of titanium must be carefully controlled to prevent contamination from hydrogen, oxygen or nitrogen. These elements, when present in the titanium sponge, harden or embrittle the final product, sometimes sufficiently so as to jeopardize forming or performance. They are difficult and sometimes impossible to remove by further treatment. It is for this reason that commercial casting of titanium must be done in a vacuum or inert atmosphere. In addition, mold material must be carefully selected. Mr. Lippert indicated that powder techniques may preclude the manufacture of regular castings.

Scrap reclaiming is practiced in commercial production. However, care must be taken to use only clean scrap. Remelting may lead to embrittlement from oxygen or nitrogen. It is possible that electrolysis or another method may be developed for reclamation of scrap.

Double melting for the purpose of improving homogeneity is becoming standard practice and the operation pays additional dividends in ingot surface and metal quality.

Extrusions are now being made commercially. The metal is extruded at approximately 1700° F. and very fast. Forgings ranging up to 120 lb. are in regular production and their production requires the most powerful forging equipment.

Mr. Lippert stated that titanium is resistant to most corrosives, is light and very strong. Tensile and yield strengths of alloys commercially available are around 150,000 psi. and 14,000 psi., respectively. Elongation and impact strength average 15% and 18 ft.-lb. respectively.

The principal alloying elements are iron, chromium, aluminum, molybdenum, manganese and vanadium. The aluminum-molybdenum-vanadium and the aluminum-vanadium experimental alloys are showing excellent promise for high-temperature service.

Mr. Lippert pointed out that titanium and its alloys can be hot and cold formed, but only with proper controls. Fusion welding is done on titanium, but only on one or possibly two of the alloys. In most alloys, the strength at the weld is increased appreciably, but with serious decline in tensile and bend ductilities.

High-speed tools are generally used for machining in conjunction with a jet-type of cooling system to flood the work with coolant at the cutting edge of the tool.

Titanium and its alloys are used principally in jet aircraft parts and are eventually to be used for guided missile parts.—**Reported by R. M. Baker for Cleveland Chapter.**

THIRTY YEARS AGO

Committee appointments by President Burgess announced in the 1923 board minutes included ZAY JEFFRIES (retired vice-president of General Electric Co.) as chairman of the Finance Committee (and a member of that committee in an advisory capacity until the present day); H. M. BOYLSTON of Case School of Applied Science (now deceased), re-elected as chairman of the Publications Committee; L. D. HAWKRIDGE, vice-president of Hawkridge Brothers Co., Boston (made president in 1936, died in 1952) as chairman of the Meetings and Papers Committee; S. M. HAVENS (Chicago, deceased) as chairman of the Constitution and By-Laws Committee; W. E. BLYTHE (now district manager for Driver Harris Co. in Detroit), chairman of the Membership Committee.

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J. FLETCHER HARPER of Allis-Chalmers Co. (now vice-president, Globe-Union Mfg. Co. and a national A.S.M. past president) was appointed chairman of the Recommended Practice Committee. At this same board meeting it was moved to expand the work of the Recommended Practice Committee by employing a permanent secretary.

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The new secretary of this committee joined the headquarters staff on Jan. 15, 1924. He was J. EDWARD DONNELLAN, who stayed with the Society until 1944, contributing materially to the development and growth of the present Metals Handbook. He is now vice-president of *Wire and Wire Products*.

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Certain changes in the Society's constitution and by-laws were also proposed and voted on during this period. One of the changes involved a broadening of the scope of the Society so that its purpose was changed from "To promote the arts and sciences connected with the treatment of iron and steel" to read "To promote the arts and sciences connected with either the manufacture or treatment of metals or both". A change in name to substitute "metals" for "steel" was also considered but no action was taken until 1933.

St. Louis Conducts Course On Physical Metallurgy

As part of its plan of progress, the St. Louis Chapter, in conjunction with the Missouri School of Mines and Metallurgy, has launched a night school course to serve the industries of the St. Louis area.

D. Zimmerman

The Chapter for some time has felt the need of a practcial evening course in elementary physical metallurgy. They believed that some means should be provided to benefit people employed in the metal industry who have not had a formal education in metallurgy or who do not have a place to meet as a group to discuss metallurgical problems.

With these thoughts in mind, Ben Rassieur of the St. Louis Chapter and D. S. Eppelsheimer of Missouri School of Mines, worked out two, one-semester courses in "Industrial Physical Metallurgy". The first semester consisted of lectures on the Structure of Metals, Manufacture of Iron and Steel, Binary Alloy Phase Diagrams, Iron Carbon Diagrams, Heat Treating, Principles of Pyrometry, Static and Dynamic Properties, Machinability, Gray Cast Iron and Malleable Cast Iron. The second semester consisted of lectures on Low Alloy Steels, Hardenability, High Alloy Steels, Toolsteels, Precipitation Hardening, Light Alloys, Copper and Copper-Base Alloys, Corrosion, Temperature Properties of Alloys, Furnace Atmospheres and Metallography. Donald G. Zimmerman, Owens-Illinois Glass Co., conducted the course.

It is felt by the St. Louis Chapter that the number of industries and students participating in the night course proves the need for such a course and the Chapter intends to fill that need.—**Reported by Frank Delaplane for St. Louis.**

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by
the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Course in Photoelasticity

Applications of polarized light to problems in stress analysis will be the subject of a summer course in "Industrial Photoelasticity" to be given from July 26 through Aug. 6 at M.I.T. The program is designed for the practicing engineer who has no previous knowledge of the subject, and emphasis will be on the applications of the method to industrial problems.

Montana Receives Models

The Montana School of Mines has received donations of working models of mining and construction equipment from several large manufacturing companies. Models include: A crawler tractor with attached bulldozer from International Harvester Co.; a bottom dump-tractor trailer from General Motors Corp.; a continuous bucket loader from Barber-Greene Co.; an air-cushion compressor valve from Pennsylvania Pump & Compressor Co.; models from Thew Shovel Co.; coal mining, loading and transporting equipment from Joy Mfg. Co.; and a Tournarocker from LeTourneau-Westinghouse Co. These models will be used in the training of future mining engineers.

Brazil Industry Expands

Inauguration of a second blast furnace last month at Volta Redonda, Brazil's first ranking steel mill, will boost production capacity to about 700,000 tons of steel ingots a year.

Sun-Power

The Bell Telephone Laboratories have developed a device that will power radio or telephone transmission which is based on specially treated silicon disks. The only energy source used to make it work is the sun. The energy converter, called a solar cell, can also be operated from the light of a light bulb. The key element in the solar device is silicon.

Fiat Gets Republic Agreement

Republic Steel Corp. has signed an agreement with Fiat of Turin, Italy, for the Italian firm to produce Republic's Enduro stainless steels and heat resisting steels in all grades for distribution in Italy.

Jet Transport

A U. S. jet tanker transport has recently been completed by the Boeing Airplane Co.

Aluminum Fences

Aluminum fences are being erected in the Swiss Alps to prevent devastating snow avalanches. The strength and portability of the metal makes it ideal for this purpose.

Air Hunt for Minerals

Aerial search for new mineral fields is being conducted in the Philippines by Hunting Geophysics, Ltd., a British firm, under a contract partially financed by Foreign Operations Administration. Effort is being made to uncover important new deposits of iron ore to meet rapidly increasing export demands.

Electronic Ear

An electronic ear, developed by Raytheon Mfg. Co., Waltham, Mass., can distinguish any one of 84,000 different noises in what may seem to the human ear to be a single sound. The company says it can analyze such things as engine vibration and tell whether the cause is loose bearings, unbalanced crankshaft, or something else.

Working Party on Corrosion

The Working Party on Corrosion, which held its last international meeting in 1943, has resumed activities and plans to hold a Corrosion Congress in Frankfurt in November 1954. Headquarters of the Party are DECHEMA, Frankfurt.

New Rod Mill

The American Steel and Wire Division of U. S. Steel has begun construction of a new rod mill in Cleveland. Facilities will include a combination rod mill and billet and rod storage areas. The mill will incorporate the latest equipment and methods to effect maximum efficiency and production and further increase the quality of the Wire Division's products.

Heating Apartments

Snow-melting coils of wrought iron pipe embedded in outside corridors of the Roosevelt Terrace Apartments in Jamaica, N. Y., mark a radical departure from traditional design features of large multi-story residences. The piping networks are made of ¾-in. wrought iron pipe, bent and fabricated into coils. Heated water mixed with anti-freeze is circulated through the corrosion resistant piping to melt snow and prevent ice.

X-Ray Boon

An X-ray unit that works from a tiny particle of radio-active thulium gives off rays comparable in energy to a large 100,000-volt X-ray machine. The unit, which weighs less than 10 lb., was developed by scientists at the Argonne National Laboratory of A.E.C. Argonne expects the unit to be used in Army field hospitals, naval vessels and far-off construction projects for diagnostic purposes. The radio-active thulium is kept in a shielded container. A shutter mechanism, which operates from a standard photographic cable release, opens and closes when taking an X-ray photo.

New Furnace

Leeds & Northrup Co. has developed an electric furnace that can measure and control the carbon content of the steel it is processing through all stages of its operation. Intricate components can be formed from easy-to-handle low carbon steel, then be put in the furnace for toughening. The new furnace greatly reduces machining and assembly time on small, hard steel parts.

Beryllium Refining

The Light Metals Refining Corp., New York, has developed a new process for refining beryllium and other metals from ore. The process uses a powerful electric arc at a temperature of 15,000° F. to refine the metal, and can reduce the cost of producing the metal by as high as 75% in some instances.

Stainless Alloys

Cornell Aeronautical Laboratory, Inc., has developed new stainless steel alloys with high-temperature strength for the Navy Bureau of Aeronautics. The metals are basically chromium-nickel stainless steels, modified with small amounts of titanium and boron.

Titanium Frit

A titanium frit for porcelain enamel has been developed by the Ferro Corp. specifically to meet the needs of the appliance industry in the manufacture of colored home appliances. Known as "1700" frit, the new titanium enamel provides true color values and its high stability results in strong resistance to fading or color variance.

Speaker Demonstrates Magnesium Products

From Left: H. J. Huester, Chairman, Dale H. Black, Dow Chemical Co., Who Gave a Talk on "Magnesium", and W. S. Morris, Vice-Chairman, Look Over the Exhibits Mr. Black Used to Demonstrate His Lecture in Jacksonville

Speaker: Dale H. Black
Dow Chemical Co.

A number of interesting topics were discussed in a talk on "Significant Magnesium Industry Developments" presented by Dale H. Black, magnesium technical service and development department of the Dow Chemical Co., at Jacksonville.

Mr. Black reviewed the general characteristics of magnesium, including its inexhaustible source in sea water. All of magnesium's various product forms were discussed, including castings, sheet and plate, extrusions and forgings. Details of the production of these product forms were described. Some of the many ways in which magnesium may be worked, such as forming, joining, spinning, forging and drawing, were covered, as well as current methods of chemical and anodic treatment for corrosion protection.

The magnesium industry is making rapid strides in the development of new alloys, new applications for magnesium, the lightest of all our structural metals, and in the expansion of facilities for producing magnesium-wrought products. In discussing the development of new alloys, Mr. Black stated that new casting alloys are designed for operations at temperatures as high as 700° F., and new sheet and extrusion alloys are now in limited pilot plant status which have useable mechanical properties up to 600° F.

A 20-min. movie entitled "The Working of Magnesium" was shown, as well as a large number of slides which illustrated the various military and commercial fields in which magnesium alloys are finding wide usage. Mr. Black outlined Dow Chemical's new Madison, Ill., facilities for producing magnesium-wrought products. A new coil rolling technique has been placed in production which increases Dow's capacity to produce sheet and plate manyfold. A 2000-lb. rolling ingot is now used, where a 140-lb. ingot was previously used in the production of magnesium sheet and plate. The installation of this new production facility has resulted in a lowering of magnesium sheet prices by as much as 28%. A 13,200-ton extrusion press is scheduled for late 1955 operation.

Booklets entitled "Modern Uses of Magnesium, Magnesium Alloys and Products, Finishing, Machining and Joining" were distributed to those present, and an exhibition of magnesium products was also provided by the Dow Chemical Co.—**Reported by Walter Morris for Jacksonville Chapter.**

ASM sponsors and participates in the National Metal Congress and Western Metal Congress in which other national technical societies hold simultaneous meetings during the Metal Expositons.

Compliments

To E. E. THUM, editor, *Metal Progress*, H. A. ANDERSON, materials development engineer, Western Electric Co., Chicago, JAMES ASTON, consulting metallurgist, A. M. Byers Co., Pittsburgh, and SAM TOUR, general manager and president, Sam Tour and Co., Inc., New York, on receiving Awards of Merit from the American Society for Testing Materials during the Society's 57th Annual Meeting in Chicago the week of June 14. The awards were given to these men for having rendered outstanding service to A.S.T.E., particularly in its technical committee work.

♦ ♦ ♦

To. E. T. WESSEL and R. D. OLLEMAN, metallurgical and ceramic department, Westinghouse Electric Corp., East Pittsburgh, on receiving the Richard L. Templin Award of the A.S.T.M. for their paper "Apparatus for Tension Testing at Subatmospheric Temperatures". The award is presented for a paper describing new testing methods and apparatus, the purpose of the award being to stimulate research in the development of testing methods and apparatus.

♦ ♦ ♦

To JOHN T. RICHARDS, chief engineer, Penn Precision Products, Inc., on receiving the Sam Tour Award of the A.S.T.M. for his paper "Corrosion of Beryllium Copper Strip in Sea Water and Marine Atmospheres", presented at the 1953 Annual Meeting. The purpose of this award is to encourage research on the improvements and evaluation of corrosion testing methods.

♦ ♦ ♦

To RALPH R. WEST, president of West Steel Casting Co., on being re-elected president of the Cleveland Engineering Society. This is the second time in the Society's history (founded 1889) that a president has been re-elected for a second term.

♦ ♦ ♦

To FRANK L. LAQUE on being elected vice-president of the International Nickel Co., Inc., and manager of its development and research division; and to O. B. J. FRASER on being promoted to assistant manager of the development and research division.

♦ ♦ ♦

To E. C. BAIN, on his election to membership in the National Academy of Sciences. Dr. Bain is vice-president in charge of research and technology at U. S. Steel Corp.

♦ ♦ ♦

To ROBERT S. LYNCH, president of Atlantic Steel Co. and past chairman of the Georgia Chapter A.S.M., on being chosen to deliver a speech on "The Supervisor's Role in Preserving Our Freedom" before the National Conference of Industrial Management Clubs in Atlanta recently.

Meet Your Chapter Chairman

WARREN

CLAYTON H. CARLETON was born in Medina, Ohio. He received a B.S. degree from Ohio Wesleyan University, a M.S. in education from Akron University, and did graduate work in physics and education at the Universities of Michigan and Wisconsin. He was on the track team for four years at Wesleyan.

Mr. Carleton's job out of school was in teaching, after which he became a director of research for Resistance Welding and Press Manufacturing, a position he held for nine years. He returned to teaching physics in 1953.

Mr. Carleton is married and has two married sons, two grand-daughters and a grandson. He is a member of the National Education Association, the American Welding Society and the Masons, and he has held all Warren Chapter offices.

He likes to hunt and fish, and spends a lot of time working with young people of high-school age who have scientific interests.

PENN STATE

LOUIS E. COLTERYAHN was born in Burgettstown, Pa., and received his B.S. degree in metallurgical engineering in 1943 from the University of Pittsburgh, his M.S. in metallurgy in 1951 from Pennsylvania State University, and he has recently completed work for a Ph.D. degree in metallurgy at Penn State. His first job was as a research metallurgist for Westinghouse Electric Corp., working on the development of high-temperature alloys. He later worked as a research metallurgist in the development of new grades of open-hearth steels and on research and development of high-temperature alloys and cermets.

Louis is married and has two children. He belongs to several honorary and social fraternities, and is a Freemason, a member of the Scottish Rite and a Shriner. His favorite hobbies are reading and travel.

YORK

DONALD SENER, chief inspector and metallurgist, Harrisburg Steel Corp., was born in Elizabethtown, Pa., in 1913. He attended North Carolina State College from which he received a B.S. degree in chemical engineering, and Carnegie Institute of Technology, where he did graduate work in chemical engineering.

Mr. Sener has a son, Jeffrey, 8 years old, and a son, Donald, 2 years old. He is a member of the A.S.T.M., the American Ordnance Association and the Masons. He has served in many capacities of the York Chapter A.S.M., and on the regulations committee of the Compressed Gas Association. He is active in church and Sunday school activities and amateur building. He served for a short time in the chemical warfare department of the Army as a lieutenant during World War II.

PHILADELPHIA

D. M. SCHMID was born in Zanesville, Ohio, and graduated from Carnegie Institute of Technology, where he was active in track and tennis. He was employed in sales, research and sales management work before becoming president and treasurer of Techalloy Co. Inc., the positions he now holds.

Mr. Schmid is a director of the Wire Association and a member of the National Sales Executives. He has held various offices in both the Philadelphia and the Pittsburgh Chapters A.S.M. He likes to golf, play tennis, ice skate, swim and play squash, and contributes much time and effort to charitable and educational activities.

ROCKFORD

GERALD NEVINS, a native of Savanna, Ill., attended high school there. He was active in football, track and basketball at school. His first job was in selling and he is presently assistant metallurgist at the Atwood Vacuum Machine Co.

Mr. Nevins is married and has two boys and a girl. He is active in church and Elk work. He spends his spare time in nonparticipating sports, fishing or technical studies. He enjoys his family and includes it in most off-time activities. He has held several offices in Rockford Chapter over the past several years.

PUGET SOUND

MONTE PARKER was born in North Dakota in 1897. He has taken many university courses pertinent to teaching in the field of metals, and although he holds no degree, has the equivalence of seven years of college.

He is completing his 34th year of teaching vocational classes in general mechanics and metals for the Seattle public school system. He spent 4½ years in the Navy during the war, and was officer-in-charge of test laboratories at the Charleston Navy Yard when retired from active service as a commander in 1946.

Mr. Parker has two grown sons and a high-school age daughter. He is a Mason and a volunteer at the Civil Defense control center. He was secretary of the Puget Sound Chapter A.S.M. for the first five years of the Chapter's life.

Mr. Parker does commercial photographic work and has his own processing laboratories, specializing in industrial and analytic photography. He is also active in the Naval Reserve Training Program as an instructor trainer.

TERRE HAUTE

ARTHUR LUEHRING was born in Milwaukee and graduated from Indiana State Teachers College. He took a job as a machinist apprentice after graduating from college and for 36 years thereafter was a teacher of industrial education at the Indiana State Teachers College. Mr. Luehring is now retired.

He has one daughter. He enjoys fishing and traveling. He belongs to the Indiana Industrial Education Association and the Central Christian Church in which he is an elder.

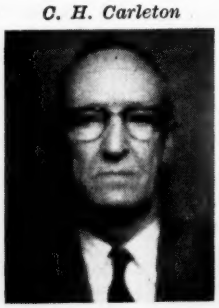
MINNESOTA

W. B. F. MACKAY was born in Winnipeg, Manitoba. His primary schooling was obtained in Canada and he received a B.Met.E. degree in 1940, a M.S. degree in physical metallurgy in 1947 and a Ph.D. degree in physical metallurgy in 1953, all from the University of Minnesota.

Dr. MacKay, who is an assistant professor of metallurgical engineering at the University of Minnesota, was in the Royal Canadian Air Force

L. E. Colteryahn

C. H. Carleton



Donald Sener

W. B. F. MacKay

Monte Parker

during World War II, serving as engineering officer at various R.C.A.F. stations. He has one son, and he is a member of A.I.M.E., S.A.E., A.S.T.M., and other professional organizations. He joined A.S.M. in 1938 and has served on practically every committee of his Chapter.

TRI-CITY

C. H. SAVERY graduated from Iowa State College in 1932 with a degree in mechanical engineering with a major in factory management. His work history includes a job as sales engineer for the U. S. Electric Man-

C. H. Savery

ufacturing Co., Los Angeles, and various jobs in factory management and manufacturing engineering for the French and Hecht Division of Kelsey Hayes Wheel Co., Davenport, Iowa.

Mr. Savery is married and has one small daughter. He is a member of the American Society of Agricultural Engineers and the Tire and Rim Association, the Davenport Speaker's Club and the Tri-City Symphony Association. He has served in various offices of his Chapter A.S.M. His hobbies consist of a home workshop and flower raising.

Demonstrates How Electron Microscopy Helps Solve Metallurgical Problems

Speaker: R. D. Heidenreich

Bell Telephone Laboratories

The use of "Electron Microscopy and Diffraction" has made rapid strides in the past 15 years and it is now being used to solve everyday metallurgical problems. The Buffalo Chapter learned of many of its accomplishments at a meeting during which R. D. Heidenreich of the Bell Telephone Laboratories was guest speaker.

Making true replicas of the surface to be examined remains a problem and the Bell Telephone Laboratories have found electron diffraction to be an indispensable tool in checking reliability. If a diffraction pattern from the surface of a specimen is typical of the material, it can be assumed that the surface is free of stains or other interfering residues and work can proceed on a replica. Electron diffraction proved valuable in removing speculation from a study of the precipitate which forms during the heat treatment of Alnico 5 alloy. Originally, the precipitate was too fine for resolution, even in the electron microscope, but aging at 800° F. caused the precipitated particles to grow to a size easily resolved in electron photomicrographs. Electron diffraction patterns made at the start of aging and during the aging cycle showed that the composition and crystallography of the precipitate did not change.

An explanation of the stress corrosion cracking of magnesium-aluminum alloys was first provided by electron microscopy. Residual iron in solid solution was found to be the cause. A magnesium-aluminum precipitate, originally suspected, was actually beneficial because it absorbed iron from the solid solution matrix.

Another useful application has been the study of lead-silver alloys of silver contents up to about 0.02%. Again, precipitated silver particles were much too fine to be resolved under an ordinary light microscope and could only be studied by electron microscopy.

The slip lines in pure aluminum crystals have been shown to consist of many steps of about 200 angstroms interplanar spacing. Distance of slip along any one crystallographic plane was about 2000 angstroms.

Mr. Heidenreich also described the emission microscope. This instrument utilizes a flow of electrons directly from a specimen surface to study transformations at the time they are taking place. A relative newcomer, it has supplied information on the transformation of austenite to ferrite which could not be obtained in any other way.—**Reported by A. E. Leach for Buffalo Chapter.**

Quality Control Conference

The first annual Western Regional Conference of the American Society for Quality Control, in conjunction with the National Conference of the Aircraft Technical Committee, will be held in San Diego Aug. 9 and 10, 1954. The program, based on the theme "Investment Dividends From Modern Quality Control Methods", will feature speakers who will present talks on what may be expected to be realized through specific, modern quality control methods.

Rochester Holds Final Meeting of 1953-54 Season

The Rochester Chapter closed its 1953-54 season with a report by N. J. Finsterwalder, Chapter secretary-treasurer, of the activities of the Chapter over the last year. He showed a series of sport movies on golf, hunting, fishing and sailing. New officers were elected and the Chapter adjourned until the fall.—**Reported by Sydney Gamlen for Rochester Chapter.**

Worcester Holds Ladies Night

The Ladies Night meeting of the Worcester Chapter featured a dinner-dance and a talk by Wesley B. Reed on "Musical Oddities of the Victorian Era". Mr. Reed, a collector of obsolete musical instruments and an amateur musician, described his collection and selected 15 or 20 instruments as examples of what was used to produce the popular music of the latter part of the 19th Century.—**Reported by C. Weston Russell for Worcester.**

Talks on Crystal Gazing at Wichita

Kenneth E. Rose, Associate Professor of Metallurgical Engineering, University of Kansas, Talked on "Crystal Gazing" at a Meeting in Wichita. Mr. Rose showed the formation and growth of various crystals from solutions and from melts. Attending the meeting were, from left: A. A. Melby, treasurer; E. E. VanMeter, vice-chairman; R. E. Layton, chairman; Mr. Rose; W. E. Ellis, member of the executive committee; and Louis G. Montre, secretary. (Photograph by A. A. Melby. Reported by Jonathan Ewert for Wichita)

Officers of New Northeast Pennsylvania Chapter

Officers of the Newly Organized Northeastern Pennsylvania Chapter Shown Displaying the Chapter's Charter at the First Technical Meeting Are, From Left: W. Pollack, Secretary-Treasurer; F. R. Studer, Arrangement and Reception; L. P. Clare, Chairman; J. J. Penkoske, Vice-Chairman and Program Committee; W. G. Smith, Education Committee; F. C. Brautigam, Membership; H. L. MacGregor, Executive Committee. Not shown: R. H. Thompson, publicity and public relations; F. C. Pierce, entertainment; W. M. Gortner

How Bureau of Standards Is Expanding Metallurgy Described at Openhouse

Once a year the metallurgy division of the National Bureau of Standards holds open house, and on May 13, 1954, over 100 metallurgists from all sections of the country were welcomed by Director A. V. Astin and John G. Thompson, head of the division. The day was spent in listening to a series of talks by the section chiefs and an inspection of the Bureau's facilities.

It is apparent that the scope of the researches and the metallurgical interests are being steadily broadened. Results of a survey of further desirable expansion were presented by Leroy L. Wyman, chief of chemical metallurgy. Returns to date show predominant interests in transformation characteristics, temperature resistance and dilatation data, physical properties of pure metals and accurate constitution diagrams. The Bureau will welcome further suggestions from practicing metallurgists as to how they can be helped by more intensive studies on metals and their properties.

Some of the work that was started years ago is still under way. For example, the effect of boron additions to steel is a continuing investigation under Thomas G. Digges, chief of the section on thermal metallurgy. He reviewed the effects of boron additions on ductility, temper brittleness and hardenability of steels, both from the standpoints of actual boron content and as functions of the relative effectiveness of several commercial additives. Heat treating variables such as austenitizing temperature, grain size, and rate of cooling on the martensite transformation of S.A.E. 1050 steel were discussed by S. J. Rosenberg. The Ms point was raised and the transformation rate was decreased by increasing the austenitizing temperature, an effect of larger grain size due to grain growth at higher heat treating temperatures.

Corrosion has also been under study at the Bureau for many years, and items contributing to an understanding of its fundamentals are steadily being uncovered. For example, T. H. Orem finds, in experiments with single crystal aluminum, that acids preferentially attack the cube faces and alkalies attack the octahedral faces of the crystals. H. C. Vacher subsequently described his studies on the formation of the sigma and chi phases in Types 316 and 317 stainless steels, as well as their identification. In addition, other studies outlining the characteristics of the iridium-osmium alloys were discussed. Testing techniques are being expanded. Metal ultrasonic delay lines were studied by R. W. Mebs with a specific product requirement in mind. However, the scope of the investigation clearly reveals that ultrasonic transmission is a structure-sensitive property that may well prove beneficial in metallurgical studies. C. J. Newton discussed the application of polarized light microscopy to the study of tin, aluminum and monel microstructures. While this method cannot completely determine crystal orientation, he believes that it offers potentialities in studying grain orientation relationships.

Finally, several facets of the Bureau's researches into alloy diagrams were interestingly presented by R. W. Buzzard in his description of the silver-uranium and gold-uranium constitution diagrams. In comparing these systems to the copper-uranium system, the binary equilibrium diagrams of uranium with the metals in Group Ib of the periodic system (such as silver and gold) are quite inconsistent with modern alloy theory with respect to uranium. However, when such theory is supplemented by ionic considerations and ionization potentials are embodied in the calculation, the behaviorism becomes more nearly in line with expectancy.—**Reported by Special Correspondent at the Bureau of Standards.**

Speaker Available

Karl M. Weigert, research metallurgist, Goldsmith Brothers Smelting & Refining Co., has informed Headquarters that he is available for speaking engagements before A.S.M. chapters. Dr. Weigert's talk on the "Physical Properties of Silver Brazing Alloys" includes colored slides which describe phase structures and a discussion of the specifications of strong silver-copper-zinc alloys and their brazing qualities. Program chairmen interested in Dr. Weigert's talk should write to him at: 1300 West 59th St., Chicago 36. Ill.

Pittsburgh Night Features Blast Furnace Burdening

Speaker: M. W. Lightner
U. S. Steel Corp.

M. W. Lightner, manager, research and development, United States Steel Corp., presented a lecture on "Burdening the Blast Furnace" at the "Pittsburgh Night" meeting of the Pittsburgh Chapter. "Pittsburgh Night" is an annual affair established several years ago as a means for recognizing the accomplishments of outstanding local metallurgists.

Mr. Lightner emphasized first the chemical and thermodynamical efficiency of the modern blast furnace plant, and reviewed in detail the principal burdening variables to be studied and controlled to promote conditions essential to a properly functioning blast furnace. These variables might logically be divided into three classifications: chemical nature of charge; physical qualities of charge; distribution of charge materials in the furnace shaft.

The materials required to produce pig iron comprise a source of iron either in its natural state or prepared in some way to meet requirements, a fuel with adequate strength and of proper quality to supply both the reductant and heat for the smelting operation, and a flux of satisfactory composition and physical qualities to combine with the impurities contained in the iron source and in the fuel to form a suitable slag. After rapidly reviewing the quantities and effects of the various chemical elements encountered in raw materials for blast furnace use, Mr. Lightner discussed effects of size consistency, and strength and reducibility of ores on coke rate production, with special reference to the use of beneficiated iron-bearing materials.

Next he discussed the characteristics of coals which affect the properties of blast furnace coke, the influence of chemical composition, physical properties and reactivity of coke on blast furnace performance. He emphasized that blast furnace operators and experimenters are rapidly reaching a common opinion that perhaps the most important single quality of coke is uniform sizing.

The fluxes used in the blast furnace process were discussed next, with reference to chemical composition, fluxing efficiency, desulphurizing ability, calcining characteristics, physical size and physical properties such as porosity and density. Chemical composition was stated to be the most important characteristic in the evaluation of a blast furnace flux. Special attention was given by the speaker to the behavior of magnesium oxide in blast furnace oxides.

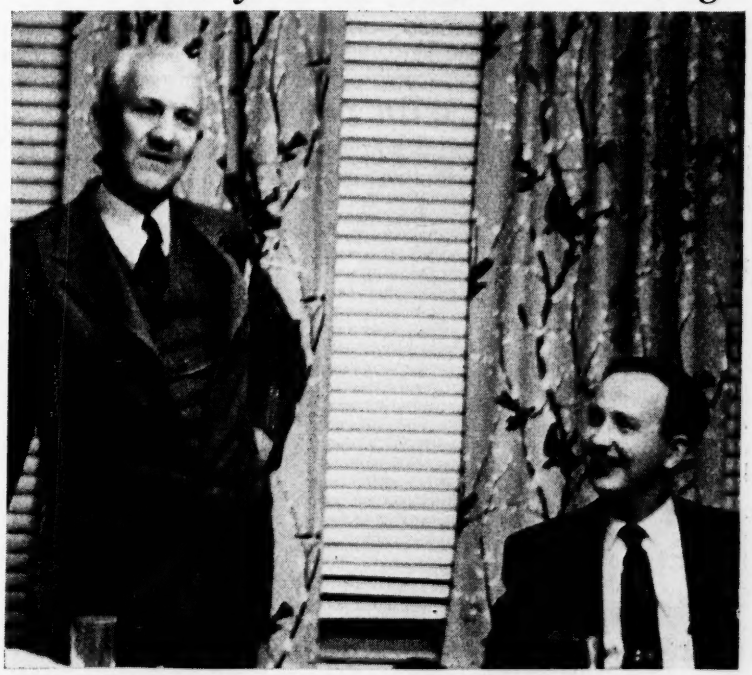
Efficient functioning of the reducing reactions within the blast furnace undoubtedly depends to a large extent upon the permeability of the descending solids to the rising gases. The term "permeability", as applied to the study of the flow of gas through beds of granular solids, implies the ease with which the gas can penetrate the bed. Mr. Lightner reported the results of various investigations on the effect of various combinations of burden materials on permeability.

For many years, blast furnace operators have been aware that one of the most important factors affecting furnace operations and the efficiency of the ironmaking process is the distribution of the charged materials in the stock column. Mr. Lightner summarized the factors influencing the distribution of stock in the blast furnace, and enumerated a number of operating variables and design features which can be manipulated to obtain optimum distribution. Among these are: size and angle of bell, bell clearance, speed and height of bell drop, rotating hopper, annular batter plate, size of charge unit, stockline height, sequence of charging on big bell, unit charging on big bell, mixing of burden materials, moisture content of ore and sizing and agglomeration of fines. The use of models to show the effect on distribution of some of the operating and design variables was illustrated and discussed.

It was pointed out that studies of burdening problems are hampered by the extreme difficulty of sampling at various levels in the stock column in a blast furnace.

Mr. Lightner forecast that much study would be required in the next decade to develop suitable methods for the agglomeration of fines and to evaluate the performance of the several types of agglomerates in the blast furnace. He stated that much research remains to be done on factors affecting coke quality and the effect of blending coals, as well as the effect of additives such as char, pitch, coke breeze, etc., upon coke quality and resulting blast furnace production. Control of the known factors affecting distribution in the stock column were stated to have contributed to less hanging of the burden and channeling of gases, but there are many indications that the use of agglomerates will present new distribution problems and may even necessitate alterations of the furnace lines.—**Reported by H. E. McGannon for Pittsburgh Chapter.**

N. E. Pennsylvania Holds First Meeting



Francis G. Tatnall (Left), Baldwin-Lima-Hamilton Corp., Who Is Shown With Chairman L. P. Clare, Spoke on "New Testing Tools and Methods" at the First Technical Meeting of the Northeastern Pennsylvania Chapter. Mr. Tatnall described the construction and mechanics of operation of the strain gage and discussed some of the applications to which the gage can be put. (Reported by A. J. Babecki for Northeastern Pennsylvania)

Dr. Wendell Hess of R.P.I. Dies Suddenly

Wendell F. Hess, director of research and head of the department of metallurgical engineering at Rensselaer Polytechnic Institute, died suddenly in April at the age of 51. He was a leading authority on the scientific aspects of welding.

Dr. Hess received a B.S. degree in electrical engineering in 1925 and a Ph.D. degree in electrical engineering in 1928, both from R.P.I. He became a member of the R.P.I. faculty in 1928, the beginning of a relationship that was to last until his death. He was promoted from instructor to assistant professor in 1930 and served in this capacity until 1938. From 1938 to 1945, Dr. Hess was an associate professor and head of the welding laboratory, and was promoted to full professor in 1945. He was appointed head of the department of metallurgical engineering and Robert W. Hunt professor of metallurgical engineering in 1947, and in 1953 was named director of research for the Institute.

Dr. Hess had written more than 50 scientific papers in the field of electric-arc and resistance welding of steel, aluminum, magnesium and nickel alloys. Some of his most comprehensive research studies were on spot welding of hardenable alloy steels, measurement of arc-weld cooling rates and flash welding of aluminum alloys. He received the Lincoln Gold Medal of the American Welding Society in 1944, the University Award of the Resistance Welder Manufacturers Association in 1944, 1945, 1947 and first and second prizes in 1948, the American Iron and Steel Institute Medal in 1944, and the John Price Wetherill Medal of the Franklin Institute in 1948.

W. F. Hess

He was a past national president and former board of director of the A.W.S., and a member of several professional societies. He was also a research consultant for Babcock and Wilcox Co.

Dr. Hess is survived by his widow, Grace Towne Hess, and four children. Mrs. Hess has asked that we pass on a word of appreciation from her and the family for the cordiality of the friendships which Dr. Hess enjoyed in A.S.M. and for the generosity of many members in making helpful suggestions towards the progress of his work.

Mixes Humor With Lecture at Tulsa

Harry B. Osborn, Jr., TOCCO Division, Ohio Crankshaft Co., Presented a Talk on "Induction Heating for Surface Hardening" at a Meeting of the Tulsa Chapter. Picture above shows Mr. Osborn retelling one of W. H. Eisenman's better stories to the amusement of George Sykora (left) and Ted Duncan. Mr. Sykora is the newly elected chairman and Mr. Duncan has just completed a year of capable management of the Tulsa Chapter

Eastern N.Y. Hears Roberts on Toolsteel

Speaker: George A. Roberts
Vanadium-Alloys Steel Co.

At a meeting of the Eastern New York Chapter, George A. Roberts, vice-president of the Vanadium-Alloys Steel Co., and national vice-president of A.S.M., spoke on "Toolsteels". The executive committee had designated the meeting as Past Chairmen's Night and all past chairmen attending were guests of the Chapter.

The speaker pointed out that the toolsteel industry is composed of many small companies with small facilities offering a great variety of types of steel. However, only nine types of steel are necessary to meet the major tooling needs of any plant. These may be classified as water hardening, shock resisting, oil hardening, air hardening, high C—high Cr, hot work, high speed and special. High alloy steels were defined as containing 5% or more of alloy and being hypereutectoid.

Many high speed steels are available with an additional 5% cobalt to impart super high-temperature hardness. In the annealed condition, 18-4-2 contains 30% by volume of carbide; however, this is reduced to 10% total carbide after the prescribed heat treatment. In the annealed condition, 10% chromium carbide is present, however, and this dissolves completely at 2000° F., furnishing carbon for hardness and chromium for hardenability to the austenite. The remaining carbide consists of molybdenum, tungsten and vanadium carbides. Tempered martensite in the matrix is the main factor affecting the ductility.

Since toughness is an important factor in evaluating a toolsteel, it is necessary to have a good test for measuring it. The unnotched bar impact test is insensitive to a change in hardness and since softening by tempering does increase toughness, this test is often misleading. The bend test has beeen found to be a good index, yielding both proportional limit and plastic deformation at maximum deflection. Deoxidation and forging practice bear on the toughness, whereas grain size has a minor effect.

A "fish scale" fracture usually results from very coarse grains. These coarse grains are due to rehardening heat treatments necessitated by machining mistakes; however, it only occurs in hypereutectoid steels. Subgrain boundaries, believed to be carbide precipitate along martensite plates, disappear on reheating. It is the disappearance of these subgrain boundaries which is believed to set off uninhibited grain growth. By carefully controlling a subsequent heat treatment, a coarse-grained steel can be grain refined by controlling the subgrain boundaries.—**Reported by J. M. Gerken for Eastern New York.**

Stress-Corrosion Cracking Theory Given at Meeting Of the Penn State Chapter

Speaker: R. B. Mears
U. S. Steel Corp.

At a recent meeting of the Penn State Chapter, R. B. Mears, manager of the research and development laboratory of the U. S. Steel Corp., presented a discussion on the "Generalized Theory of Stress-Corrosion Cracking".

Dr. Mears stated that stress-corrosion cracking referred to the spontaneous cracking of metals resulting from high stress and localized corrosion. Practically all metals are susceptible to this phenomenon under certain conditions, the most common example being the season cracking of brass.

The quantitative aspect of corrosion was described as an electrochemical reaction. That is, a flow of current is associated with this phenomenon and the amount of corrosion can be correlated to this current. Dr. Mears said that if the source of the potential differences could be found, the causes of corrosion could be established. Methods to determine these potentials were presented by the speaker.

The mechanism of stress-corrosion cracking is an extreme example of localized corrosion. In many cases, but not always, the grain boundaries are anodic to the grain centers and the path of the stress corrosion crack is intergranular.

Experiments have produced interesting observations. The electric current flowing from a stressed specimen to an unstressed specimen through a solution increases with the amount of cracking; once stressed, the specimen becomes anodic. Some compounds have been found that are inhibitors to generalized corrosion, but they greatly stimulate localized corrosion and, therefore, stress-corrosion cracking. By sending current from the solution to the specimen, stress-corrosion cracking can be stopped. This is termed cathodic protection.

Dr. Mears related further that slip planes and other metallurgical irregularities may cause anodic areas. These areas, however, are not necessarily anodic in all environments. The solution used determines the relative potential and by changing it, the potential and the effect may be altered. The reason why certain areas become anodic is not yet completely understood.—**Reported by W. B. Collins for Penn State.**

Explains Advanced Casting Techniques in Washington

Speaker: Harrison I. Dixon
Metallurgical Products Co.

"Advanced Casting Techniques" was the subject of a talk by Harrison I. Dixon, president of Metallurgical Products Co., at a meeting of the Washington Chapter.

Mr. Dixon described three new or revitalized foundry techniques—lost wax, shell molding and frozen mercury—and compared their relative merits and shortcomings. To more clearly illustrate his discussion, Mr. Dixon used motion pictures, lantern slides and color pictures in 3D of the processes and machines used in these molding and casting techniques. In addition, many sample castings of various materials were displayed which demonstrated the sizes, finishes, degrees of intricacy and other characteristics which are realizable through the three foundry techniques.

Mr. Dixon emphasized the many inherent advantages of casting as a method of shaping, and showed how progress in molding and casting techniques has made possible the fuller utilization of these advantages by eliminating many of the undesirable characteristics of common sandcasting.

It was shown by the speaker that casting, as a result of recent progress, has become a much stronger and versatile competitor for forging, welding, machining, coining and other methods of shaping metals. Mr. Dixon exemplified this point by showing a part of extreme intricacy. The dimensional tolerance, surface smoothness and soundness demands were very exacting. After repeated attempts to make the part by brazing together machined subelements had failed, Mr. Dixon showed how the problem was solved with complete satisfaction by utilization of the frozen mercury molding process. —**Reported by Richard H. Raring for Washington Chapter.**

OBITUARIES

JAMES G. MORRISON, past chairman of the York Chapter, died a short time ago of a heart attack. Mr. Morrison was with the Landis Machine Co., Waynesboro, Pa.

WALTER RAWSON, a University of Arizona metallurgical engineering student and holder of an A.S.M. scholarship to the University, was killed recently in an automobile accident in which two other students were also killed.

At Cedar Rapids Course on Heat Treatment

Edward M. Mielnik, Assistant Professor, State University of Iowa, Is Shown During One of Cedar Rapids Chapter's Educational Lectures on the "Principles of Heat Treatment" Which He Conducted. The series of five lectures had an average attendance of 50 persons, and the last session, handled by Muir L. Frey of Allis Chalmers Corp., was attended by 100 persons. He spoke on "Case and Surface Hardening"

Describes Unusual Metals in Industry

"Unusual Metals in Industry" Were Discussed by Bruce W. Gonser, Technical Director, Battelle Memorial Institute, at a Meeting in Dayton. Shown above are, from left: Chairman J. G. Gantner; Robert Zipf, county coroner, the coffee talker; Dr. Gonser; and past - chairman R. L. Moncrief

Speaker: Bruce W. Gonser
Battelle Memorial Institute

"Unusual Metals in Industry" were described by Bruce W. Gonser, technical director of Battelle Memorial Institute, at a meeting in Dayton.

As our civilization becomes more complex, our needs become harder to fulfill. In years to come some of the more unusual metals will be developed into useful materials for industry. But, in the meantime, no one wants to work on the production problems until there is a demand for the metal, and no one wants to work on uses until the metal is commercially available.

Dr. Gonser discussed the metal elements most abundant in the earth's crust. So far metallurgists have not developed a perfect metal or alloy; each individual element has advantages and adaptabilities for various end uses.

Silicon, for instance, is cheap and light, but is not ductile. Its big future is probably in the field of coatings and as a semiconductor in the electronics field. Aluminum-coated steel should not be overlooked as a material of construction. It has some possibilities as a replacement for tin cans in many applications. The electrolytic deposition of aluminum is the newest thing along this line. Vanadium is available in substantial amounts, occurring with some of the uranium ores, but there really is a lack of uses for the metal itself. Lithium is another metal that may turn out to be most useful if it can be protected properly. With a specific gravity of 0.54 it would float on water except that it reacts violently with water.

Dr. Gonser mentioned yttrium as another of the unusual metals which has no good applications as yet. It might also have useful properties if it could be protected. Gallium is interesting since it melts at 94° F; it might be useful as a heat transfer medium but, unfortunately, it reacts with almost everything at elevated temperatures. Selenium, a light-sensitive semiconductor, is normally recovered as a byproduct of copper production but has also been found concentrated in some plant life. Mercury is being used in some electrolytic cells and is a useful carrier of some reactive metals for other chemical reactions. Indium is one of the softest metals and there is quite a lot available—for a price. Iridium is considered to be one of the hardest metals and, like others of the platinum group, would find many applications if it were not so costly and scarce.

To know what a metal can do you have to first make it pure. The iodide process is one of the ways by which, by thermal decomposition of a volatile iodide, the pure metal can be recovered and often in a form that can be reworked into useful products. Although chromium is considered to be quite hard, it is really a ductile metal in the pure form but it will not take a sharp impact. There has been much interest in molybdenum due to its high melting point. But to use this physical property to advantage and to secure high creep strength at high temperatures, the pure metal must be alloyed and afforded surface protection to prevent oxidation.

The good metallurgist should also keep up to date on the rest of the unusual metals such as hafnium, thorium, rhenium and osmium. They all have useful properties and help to build the reservoir of metallurgical tools from which the problems of the future will be solved.—**Reported by D. C. Heckard for Dayton.**

Establish Meno Lissauer Scholarship at Brandeis

The Meno Lissauer Scholarship at Brandeis University, Waltham, Mass., has been established in honor of the chairman of the board of the Associated Metals and Minerals Corp. by members of the firm. The Scholarship will be awarded annually to an outstanding student in the field of chemistry. Should Brandeis open a department of mining engineering or metallurgy, preference will be given to students in those fields.

Conference for Engineers at Ohio State

About 600 Alumni, Faculty, Students and Guests Attended the First Annual Conference for Engineers at Ohio State University in May. Admiral H. G. Rickover addressed the luncheon gathering and Charles F. Kettering addressed the morning session. The afternoon was devoted to technical meetings in the departments of the College of Engineering and inspection of the laboratories and numerous research projects underway. The photograph above was taken during inspection of the metallurgical laboratory. Shown are, from left: W. L. Larson, O.S.U.; Bud Sprankle, Timken Roller Bearing Co.; R. M. Goldhoff and E. Eicken, O.S.U.; and M. C. Uhl, Ohio Brass Co.

New York Chapter Holds Student Night Meeting

At the Special Students Night Meeting Held by the New York Chapter, Student Harry Rudloe (Left), Is Shown Receiving the Chapter Gavel for the Evening From Chairman Neal Russell While Speaker Joseph Spretnak and Peter Payson Look On. Pictured above are the students who attended the meeting. Prof. Spretnak presented a talk on "Boron Hardenability in Steel" which was reported on p. 32 of the June issue of Metals Review. *(Reported by Harold Margolin for the New York Chapter.)*

Carolinas Meeting Features Talk on Welding Techniques

Speaker: Charles Brown

Eutectic Welding Alloys Corp.

The Carolinas Chapter of the American Society for Metals was host to the Piedmont Chapter of the American Society of Tool Engineers at a session held recently. Charles Brown, divisional sales manager, Eutectic Welding Alloys Corp., spoke on "New Welding Procedures", confining his talk principally to low-temperature alloys. He outlined certain welding procedures such as the proper cleaning of the parts to be welded and the selection of the method of weld, and stated that care should be taken in selecting the proper alloy rod for the job.

He mentioned the various types of welding fixtures available to do the job, giving consideration to the size of the parts to be welded and the amount of distortion which could be expected.

In preparing welding fixtures, stress and distortion due to the heat which causes deformation of metals and expansion on various metals and the difference of expansion between different metals must be considered. Cast iron prsents one of the most difficult welding problems. In regard to jigs and fixtures for welding, the simplest fixture possible is usually the best. Much work is being done by his company and others on welding metals without heat being applied, and he mentioned that some welding is being done with chemicals.—**Reported by James J. Hairston for the Carolinas Chapter.**

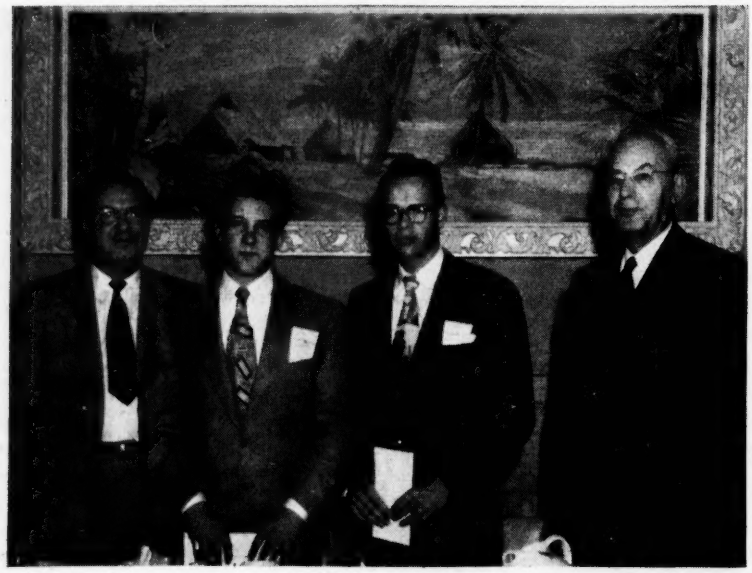
Dedicate Rodman Lab At Watertown Arsenal

A new Metals Process Laboratory at Watertown Arsenal was renamed on May 15 with appropriate ceremonies the Rodman Laboratory, in memory of Brigadier General Thomas J. Rodman who commanded the Arsenal during the Civil War years. He graduated from West Point in 1841 and his first assignment as a second lieutenant of ordnance was in Pittsburgh at the Allegheny Arsenal. Metallurgical engineering was nonexistent, yet the state of metals then in use for gun making depressed him. He determined to become a master of ordnance craftsmanship. Working in the shops and foundries, he observed and noted the metals of that day; he investigated theories of stress and strain and became convinced that there was something wrong in the then current principles of gun making. He proposed to correct those principles.

Lt. Rodman devoted himself, at first, to the development of the "Rodman casting process" as a means of forming guns. (This was briefly described in Peter Kosting's historical account of cast iron guns in ***Metal Progress*** for May; it includes a water-cooled core so solidification starts at the bore and progresses outward.) Its radical departure from accepted practices led to frustrations. Three times he offered his process to the American Government and three times it was turned down. Finally, he was given permission to see if private industry would try his process; he found a backer in Messrs. Knapp & Totten.

"Rodman guns" up to 20-in. caliber were considered the best in the world. His later efforts to increase the endurance of guns led him to investigate cannon powder, and his improvements (eagerly copied by the English, Germans and Russians) are ranked by ordnance experts as being of equal importance to his innovations in gun manufacture.

Scholarships Awarded at Calumet Meeting



The Annual Pallotto-A.S.M. Scholarship Awards Were Presented to Two First Year Engineering Students at a Recent Meeting of the Calumet Chapter. Shown above, from left, are: M. N. Pallotto, Steel City Testing and Engineering Laboratories, who presented the scholarships; Larry Schlagel, winner of the first award; Jack D. Tinkler, winner of the second award; and F. F. Schlosser, chairman of the Calumet Scholarship Award Committee

Speaker: Barclay Morrison

Carpenter Steel Co.

The Annual Pallotto-A. S. M. Scholarship Awards were presented to two area high-school graduates, Larry Schlagel of Gary Edison High School and Jack D. Tinkler of Thornton Fractional High School, at a meeting of the Calumet Chapter. These scholarship awards are designed to financially assist qualified engineering students through their first year of college. The scholarships are awarded by M. N. Palloto of the Steel City Testing and Engineering Laboratories to encourage interest in related sciences.

At this same meeting, 25-year membership awards were presented to R. C. Corns of National Tube Division and H. R. Boatman of Inland Steel Co. A 25-year sustaining membership certificate was also presented to the Continental Foundry and Machine Co.

The speaker of the evening, Barclay Morrison of Carpenter Steel Co., spoke on the "Corrosion Engineer Looks at Stainless Steel". He pointed out the many reasons for the popularity of stainless steels, naming particularly its high strength-to-weight ratio, high-temperature strength, low-temperature strength and its resistance to corrosion.

Mr. Morrison described the mechanics of corrosion and the effect of various corrosive media upon the surface of stainless steel, the formation of the chromium-oxide layer at the surface and its resistance to corrosive attack by oxidizing agents, the formation of readily soluble chromium chlorides at the surface in oxygen-starved reducing atmospheres and the rapid attack to be expected under such conditions.

Mr. Morrison, with the aid of slides, listed and discussed the five general types of corrosion attack encountered by stainless steel in service: General corrosion to describe an all-over corrosive attack; galvanic corrosion, the attack created by galvanic cells set up between two metals, or between the same metals in active and passive state; pit-type corrosion caused by the localized breaking down of the passive layer which then becomes anodic to the remaining passive layer; intergranular corrosion, where chromium carbides precipitated at grain boundaries reduce the chromium content adjacent to the boundaries, leaving these areas susceptible to corrosive attack; and, finally, stress corrosion, which is confined to the austenitic grades of stainless steel under certain conditions of tensile stress in the presence of a mild corrosive medium.—**Reported by K. R. Hine for Calumet.**

Rawdon of Bureau Of Standard Dies

Henry S. Rawdon, former chief of the Metallurgy Division of the National Bureau of Standards, died in May.

Mr. Rawdon was born in England in 1880. He was four year old when his family came to Michigan, where he attended elementary school and graduated from Michigan State Normal College. After six years as a teacher of chemistry and biology he entered the College of Engineering of the University of Michigan, where he became interested in the newly introduced subject of metallurgy and, in his senior year, was personal assistant to the blind Professor Edward DeMille Campbell, one of the outstanding members of the small group of pioneer metallurgists.

On receipt of the degree of B. Ch. E. from the University of Michigan in 1912, Mr. Rawdon had started post graduate work when he received an appointment as assistant physicist at the National Bureau of Standards. His first assignment was with the late George K. Burgess in the section of metallurgy and metallography. He was a member of the Metallurgy Division from its formation, and its chief from 1929 until he retired in 1945.

H. S. Rawdon

Metallography, particularly the relation of crystalline structure to the properties and behavior of metals, was Mr. Rawdon's major interest. His early publications dealt with a variety of subjects, both ferrous and nonferrous, and much of this was pioneer work. Metallographic studies of corroded metals led to an interest in corrosion processes and in protective coatings. His book, "Protective Metallic Coatings", published in 1928 by the American Chemical Society, was one of the first in this field. His interest in, and knowledge of, other phases of metallurgy, is evidenced by his 83 technical publications and by the number and variety of technical and advisory committees on which he served.

Mr. Rawdon was a member of many years' standing of the American Society for Metals, American Institute of Mining and Metallurgical Engineers, and American Society for Testing Materials, and served on many of their committees.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

Stewart J. Stockett, Technical Abstracter

Assisted by Fred Body, Mitchell Baker, Mildred Landon and Members of the Translation Group

A
General Metallurgical

157-A. Directory of Materials. 18th Ed. *Machine Design,* v. 26, May 1954, sec. 2, p. 1-204.

Trade names, producers, specifications and information on ferrous and nonferrous metals, nonmetallic materials and finishes and coatings. (A10, L general, S22, Fe, EG-a)

158-A. The Non-Ferrous Scrap Industry. J. Chalmers. *Metal Industry,* v. 84, Apr. 30, 1954, p. 366-367.

Export and import question and its effects on British prices. (A8, EG-a)

159-A. Metallurgy at Los Alamos 1943-1945. Cyril Stanley Smith. *Metal Progress,* v. 65, May 1954, p. 81-89.

History of Los Alamos wartime work; fabrication of uranium; recently declassified information on plutonium metallurgy. Graphs, table, photographs. (A general, U, Pu)

160-A. Current Russian Metallurgical Texts. IV. Carl A. Zapffe. *Metal Progress,* v. 65, May 1954, p. 125 + 5 pages.

Seven technical books critically reviewed. Books are abstracted separately. (A general)

161-A. Zinc Has Not Been Replaced by Aluminum in Die Casting Industry, Institute Told. David Laine. *Metals (Daily Metal Reporter Monthly Supplement),* v. 24, Apr. 1954, p. 10-11.

Economic analysis of nickel, zinc and aluminum situations. Table. (A4, E13, Zn, Al, Ni)

162-A. Metallurgical Problems in Nuclear Power Reactors. I. General Considerations. Henry H. Hausner and John R. Bedell. *Sylvania Technologist,* v. 7, Apr. 1954, p. 35-41.

Operation and factors influencing selection of materials for fuels, cladding, coolants and coolant systems. Tables, diagrams, photograph. 6 ref. (To be continued.) (A general, T25)

163-A. Industrial Progress Related to Available Materials. (Digest of "Chemical Developments and Engineering Materials", by Harold L. Maxwell, *ASTM Bulletin,* Dec. 1953, p. 47-50.) *Metal Progress,* v. 65, May 1954, p. 148, 150.

Choice of materials should be based on corrosion rate, material cost, workability, absence of product contamination, minimum of maintenance costs and least interruption of operations. (A general)

164-A. Metal Canada. I. H. McLeod. *Canadian Metals,* v. 17, May 1954, p. 8 + 10 pages.

Annual review of metalworking industry in Canada. Tables. (A general, Ni, Zn, Pb, Cu, Al, Fe, ST)

165-A. Compressed Air for Ford's Cleveland Foundry. *Industry and Power,* v. 66, May 1954, p. 94-97.

Outstanding distribution system to supply compressed air to many sites throughout huge foundry. Careful planning resulted in low pressure drop in lines. Diagram, photographs. (A5, E general)

166-A. The Universal Decimal Classification Applied to Metallurgical Literature. Einar Ohman and J. P. Saville. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 183-188.

Need for rapid and accurate means of classifying. Describes system, its construction and present state. 5 ref. (A general, U8)

167-A. Department of Metallurgy at the University of Cambridge. G. Wesley Austin. *Metal Treatment and Drop Forging,* v. 21 May 1954, p. 215-223.

Facilities for teaching and research; resumé of research work in progress. Photographs. (A9, A3)

168-A. The First Century: Aluminum in France. *Modern Metals,* v. 10, May 1954, p. 82-84, 86.

Historical review. Photographs, graph, map. (A2, Al)

169-A. Five Steps to Ward Off Plant Fires. W. K. Ousley. *SAE Journal,* v. 62, May 1954, p. 29-31.

Abridged from "What Makes a Plant Safe?" presented at SAE Annual Meeting, Detroit, Jan. 1954. Studies show all major industrial fires could have been avoided if five basic, simple rules had been followed. Diagram. (A7)

170-A. The Iron Plantation. Arthur C. Bining. *Steelways,* v. 10, June 1954, p. 4-7.

Iron was once produced on plantations. A historian traces their growth and decline from colonial times until late in nineteenth century. Drawings, photographs. (A2, T26, T3, Fe)

171-A. Recent Trends in Engineering. *Times Review of Industry,* v. 8, new ser., May 1954, p. 57.

Briquetting press for recovery of cast iron. Photograph. (A8, B17, CI)

172-A. (German.) Trackless Conveying in Iron and Steel Works. Hans-Dieter Zeumer. *Stahl und Eisen,* v. 74, no. 9, Apr. 22, 1954, p. 561-570.

Handling of ores, rubbish and scrap, trucks, shovel loaders, refractory brick pliers and tipping containers. Photographs. 13 ref. (A5, ST)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

173-A. New Metals in Engineering. L. B. Pfeil. *Engineering,* v. 177, May 14, 1954, p. 620-621.

Abridged from paper presented before "Institute of Marine Engineers", Apr. 1954. Covers graphitic nickel, spheroidal-graphite cast iron and heat resisting and hard surfacing materials. Tables. (A general, Ni, CI, SG-h)

174-A. The New Radiometallurgy Laboratory at the Hanford Atomic Operation. Thomas W. Gore. *Metal Progress,* v. 65, June 1954, p. 81-87.

Prime activity is examination of physical characteristics and mechanical properties of irradiated materials, particularly uranium fuel slugs. Covers laboratory design. Photographs, diagram. (A9, U)

175-A. Review of the Metals and Minerals. *Mining Journal (Annual Review),* 1954, May p. 7 + 38 pages.

Includes "Gold" and "Silver", E. Baliol Scott; "The Platinum Metals"; "Copper" and "Tin", Ursel B. Scott; "Tinplate"; "Lead" and "Zinc", J. A. Dunn; "The London Metal Exchange"; "Aluminium", Smith Bracewell; "Magnesium"; "Titanium" and "Nickel", A. Graham Thomson; "Iron and Steel", J. H. Thompson; "Manganese"; "Nickel", A. Graham Thomson; "Chromium"; "Tungsten, Molybdenum and Vanadium"; "Cadmium"; "Beryllium"; "Cobalt"; "Columbium and Tantalum", R. Bruce Dunfield; "Reflections on Uranium Ore Production", Robert A. Mackay; "Coal", W. Davis; "Oil", W. J. Harris; "Asbestos"; and "The Diamond Industry". Photographs, tables. 23 ref. (A general, B12, Au, Ag, Pt, Sn, Cu, Pb, Zn, Al, Mg, Cr, W, Mo, V, Cd, Be, Co, Cb, Ta, U, Fe)

176-A. Technical Progress During the Year. *Mining Journal (Annual Review),* 1954, May, p. 65 + 27 pages.

Includes "Mineral Exploration", G. A. Schnellmann; "Metal Mining Developments", J. B. Richardson; "Coal Mining Practice", W. Davis; "Progress in Mineral Dressing", F. B. Michell; "Extraction Metallurgy", Graham Oldham; and "Powder Metallurgy and Alloying", A. E. Williams. Photographs, diagrams, tables. 45 ref. (A general, B general, C general, H general, U, Fe, Pb, Cu, U, Zn, Mo, Cb, W, Ti, Ni)

177-A. Copper Production in 1953. David N. Skillings. *Skillings' Mining Review,* v. 43, May 29, 1954, p. 1-2, 14-15.

Statistical data on 28 leading copper producers for 1953. Photographs. (A4, Cu)

178-A. (Book.) ASME Handbook. Metals Properties. Samuel L. Hoyt,

editor. 433 p. 1954. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. $11.00.

Charts and tables present data on strength, hardness, machinability, electrical and thermal conductivity, chemical composition, heat treatment, uses, working characteristics, and other pertinent information on more than 500 metals in common industrial use.

(A general, Q general, P general)

179-A. (Book.) **Machinery's Handbook.** 15th Ed. 1911 p. Industrial Press, 148 Lafayette St., New York 13, N. Y. $9.00.

Makes available recent and basic information, data, and formulas that user in mechanical field needs to keep abreast of current developments. (A10)

180-A. (Book—German.) **Metallic Materials for the Machine Designer.** E. Bickel. 442 p. 1953. Springer-Verlag, Berlin.

Structure and properties of crystals; alloy equilibrium diagrams and corresponding atomic theory; physical and mechanical properties. (A general)

B

Raw Materials and Ore Preparation

165-B. Some Aspects on Sintering Operations and Sinter Usage. I. Douglas Joyce. *Blast Furnace and Steel Plant,* v. 42, May 1954, p. 515-520, 554.

Benefits of incorporation of sinter in blast furnace burden depend on physical and chemical properties of sinter and properties of other constituents. Tables. (B16, D1)

166-B. The Output of Gyratory Crushers. K. Gauldie. *Engineering,* v. 177, Apr. 30, 1954, p. 557-559.

Movement of material between crushing surfaces. Output mathematically calculated. Diagrams, graphs. (B13)

167-B. Effect of Si, Mn, P, Al, C, Ni, and Cu on the Mechanism of Sulphur Transfer Across a Slag-Metal Interface. K. M. Goldman, G. Derge and W. O. Philbrook. *Journal of Metals,* v. 6, May, 1954, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 534-540.

Study of kinetics and mechanism of sulfur transfer at slag-metal interface under specified laboratory control. Graphs, tables, diagram, micrographs. 16 ref.
(B21, D general, Si, Mn, Al, Ni, Cu)

168-B. New Mineral Dressing Laboratories. *Mine & Quarry Engineering,* v. 20, May 1954, p. 225-230.

Apparatus and equipment of a well-furnished laboratory. Photographs. (B14, A9)

169-B. (Hungarian.) **The Manufacture of Magnesite Brick, Chemically Bonded With Sulfate.** Arisztid Cser. *Kohaszati Lapok,* v. 9, no. 2, Feb. 1954, p. 69-71.

Effect of moisture and bonding material on hardness. Suitable for lining of steel furnaces. 3 ref.
(B19, D general)

170-B. (Hungarian.) **Some Simple Investigations Concerning Foaming of Unfiltered Aluminate Liquor in Alumina Plants.** Mihaly Mariassy, Veronika H. Borsiczky and Istvan Somogyi. *Kohaszati Lapok,* v. 9, no. 2, Feb. 1954, p. 73-75.

Experiments to determine causes. Tables. 2 ref. (B14, Al)

171-B. (Hungarian.) **Qualitative Investigation of Bauxite.** Béla Lanyi. *Kohaszati Lapok,* v. 9, no. 4, Apr. 10, 1954, p. 162-172.

Behavior and quality of bauxites not indicated by the bauxite modulus. Tables, charts. (B10, Al)

172-B. (Hungarian.) **Data on Improving the Technology of the Settling of Red Mud by Means of Flour.** Endre Bogardi. *Kohaszati Lapok,* v. 9, no. 4, Apr. 10, 1954, p. 172-177.

Preparation, handling and effects of rye flour solutions used in alumina plants. Photographs, tables, micrographs, graphs. (B14, Al)

173-B. (Russian.) **Influence of Cations on Stability of Anions in Melted Slags.** O. A. Esin and B. M. Lepinskikh. *Doklady Akademii Nauk SSSR,* v. 95, no. 1, Mar. 1, 1954, p. 135-138.

Measurement of e.m.f. and temperature effects. Table, graph. 5 ref. (B21)

174-B. (Russian.) **Step-Like Nature of Thermal Dissociation Process of Siderites.** V. I. Kaurkovskii. *Zhurnal Prikladnoi Khimii,* v. 27, no. 2, Feb. 1954, p. 136-141.

Behavior of siderite during roasting. Graphs, table, diagram, micrographs. 5 ref. (B15, Fe)

175-B. Phosphatic Slime. Paul M. Tyler and W. H. Waggaman. *Industrial and Engineering Chemistry,* v. 46, May 1954, p. 1049-1056.

Problems of disposal; proposed industrial uses. Photographs, tables, diagrams. 4 ref. (B14)

176-B. Preparation of Ores. IV. J. M. McLeod. *Iron & Steel,* v. 27, May 1954, p. 185-191.

Methods of agglomerating fines, direct smelting processes such as pelletizing, briquetting, vacuum extrusion and nodulizing.
(B14, B16, B17, D8, Fe)

177-B. Aspects on Pelletizing of Iron Ore Concentrates. Magnus Tigerschiöld. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 13-24.

Factors affecting performance of pelletizing method. Technical development of shaft furnace process. Micrograph, tables, diagrams, photograph. 28 ref. (B16, Fe)

178-B. The Pelletizing of Northampton Sand Ironstones by Vacuum Extrusion: The Experimental and Pilot Plants at the Corby Works of Stewarts and Lloyds Ltd. A. Stirling. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 25-42.

Essentials of process and applications on low-grade ores. Diagrams, tables, photographs, graphs. 9 ref. (B16, Fe)

179-B. The Development of a Pelletizing Process for Fine Iron Ores. J. M. Ridgion, E. Cohen and C. Lang. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 43-63 + 4 plates.

Laboratory and pilot-scale work, vertical-shaft kilns, pellet structure and economic aspects. Photographs, diagrams, graphs, micrographs, table. 10 ref. (B16, Fe)

180-B. Aspects of Swedish Iron-Ore Concentration. P. G. Kihlstedt. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 63-75.

Survey of present conditions influencing beneficiation. Tables, graphs. 19 ref. (B14, Fe)

181-B. Additives Produce Strong and Reducible Iron Ore Sinter. R. D. Burlingame, Gust Bitsianes and T. L. Joseph. *Journal of Metals,* v. 6, Apr. 1954, p. 449-451.

Abstracted from paper presented at AIME Blast Furnace, Coke Oven and Raw Materials Committee Meeting, Chicago, Apr. 1954. Specific effect of additives on sintering process studied in relatively narrow section of sinter bed in which all variables were closely controlled. Photograph, graphs, tables. (B16, Fe)

182-B. Beneficiation Studies on a Pyrite Sample A From Alpha Mine, Wynaad, Nilgiris. G. V. Subramanya and P. I. A. Narayanan. *Journal of Scientific & Industrial Research,* v. 13, sec. B, Mar. 1954, p. 213-215.

Tabling and flotation studies determine use as source of sulfur. Tables. (B14)

183-B. Beneficiation Studies on a Pyrite Sample B From Alpha Mine, Wynaad, Nilgiris. G. V. Subramanya and P. I. A. Narayanan. *Journal of Scientific & Industrial Research,* v. 13, sec. B, Mar. 1954, p. 215-217.

Gravity and flotation methods used. Sulfur present in form of cubical pyrite. Tables. (B14)

184-B. By-Product Uranium Program. James A. Barr, Jr. *Mining Congress Journal,* v. 40, May 1954, p. 39-40.

Economic production from low-grade domestic phosphate rock. Photographs. (B general, U)

185-B. Alkaline Pressure Leaching Processes. F. A. Forward. *Mining Congress Journal,* v. 40, May 1954, p. 49-52, 77.

Operation at high pressures and temperatures speeds reactions and permits difficult separations with great economies in equipment and reagents. Photographs, diagrams. (B14, Co, U, Cu, Ni)

186-B. Taconite Beneficiation Comes of Age at Reserve's Babbitt Plant. Oscar Lee. *Mining Engineering,* v. 6, May 1954, p. 484-488.

Equipment and operation of concentrating and pelletizing plant. Photographs, tables. (B14, B16, Fe)

187-B. Flotation and the Gibbs Adsorption Equation. P. L. de Bruyn, J. T. G. Overbeek and R. Schuhmann, Jr. *Mining Engineering,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 199, May 1954, p. 519-523.

Shows need for experimental work in surface chemistry and mineral-air interface. 20 ref. (B14)

188-B. Evaluation of Sinter Testing. E. H. Kinelski, H. A. Morrissey and R. E. Powers. *Mining Engineering,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 199, May 1954, p. 527-533.

Various sinters and an iron ore were used to evaluate testing methods adapted to appraise sinter properties. Properties of strength and dusting were related to total porosity, slag ratio and total slag. Tables, graphs, diagrams. 15 ref.
(B16, B21, Fe)

189-B. Developments in the Science of Mineral Dressing. E. F. Pryor. *Times Science Review,* 1954, Summer, p. 17-18.

Past and present mechanical and chemical methods. Includes graphite, copper and others. Photographs. (B general, Cu)

190-B. (German.) **Quartz Bricks and Blocks.** Alexander Frhr. v. Beaulieu Marconnay. *Werkstoffe und Korrosion,* v. 5, no. 4, Apr. 1954, p. 123-129.

Production and use in copper works, openhearth furnace, chemical works and specialized electric furnaces. Diagrams. 11 ref.
(B19, C21, D2, D8)

191-B. (German.) **New Installations of the Mechernich Mining Co. With Special Consideration to Beneficiation.** Edgar Puffe. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 4, Apr. 1954, p. 141-152 + 2 plates.

Concentration of low-grade lead ores. Diagrams, maps, photographs, tables. 33 ref. (B14, Pb)

192-B. (Russian.) **Influence of Gaseous Medium on the Sinterability of Chromic Oxide.** P. P. Budinkov and S. G. Tresviatskii. *Doklady Akademii Nauk SSSR,* v. 95, no. 5, Apr. 11, 1954, p. 1041-1042.

Preparation in protective atmospheres of nitrogen, argon or a vacuum. Table. 5 ref. (B16, Cr)

193-B. (Russian.) **Some Reasons for Incomplete Leaching of Gibbsite Bauxites.** S. I. Beneslavskii. *Doklady Akademii Nauk SSSR,* v. 95, no. 5, Apr. 11, 1954, p. 1077-1080 + 1 plate.

Presence of various amounts of monohydrates of aluminum in amorphous or corundum forms. Tables, graphs, micrographs, spectrogram. 9 ref. (B14, Al)

194-B. (Russian.) **Influence of Oxygen on the Flotability of Galenite and Chalcopyrite.** S. V. Bessonov and I. N. Plaksin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 1, Jan. 1, p. 114-127.

Qualitative index of effects of oxygen on collecting agent. Table, graphs, photographs. 9 ref. (B14, Pb, Cu)

195-B. (Russian.) **Sulfurization of Manganese Dioxide by Ferrous Sulfate and Pyrite.** H. P. Diev, M. I. Kochnev, V. V. Paduchev and G. Ia. Sioridze. *Zhurnal Prikladnoi Khimii,* v. 27, no. 4, Apr. 1954, p. 356-359.

Oxidation roasting at temperatures of 500 to 600° C. permits transformation of 90 to 98% of manganese into a sulfate. Diagram, graphs, tables. 3 ref. (B15, Mn)

196-B. The Selective Reduction of Iron in Ilmenite and the Oxygen Pressure of TiO_{2-x} (Rutile). G. G. Michaud and L. M. Pidgeon. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 505, May 1954, p. 307-309; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 187-189.

Investigates oxidation of rutile phase in equilibrium with H_2-H_2O mixtures of various compositions from 1200 to 1450° K. Diagram, graphs. 8 ref. (B14, Fe, Ti)

197-B. The Significance of Agglomeration in the Mineral Industries. E. Swartzman. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 505, May 1954, p. 318-327; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 198-207.

Processes, equipment and products. Tables. 19 ref. (B14)

198-B. Pioche Makes Ferromanganese in New Electrolytic Furnace Plant. Stanley Dayton. *Mining World,* v. 16, May 1954, p. 39-41.

Operation of plant. Photographs. (B22, Fe-n)

199-B. (Russian.) **Distribution of Sulfur Between Metal and Slag From the Standpoint of the Ionic Theory.** O. Esin. *Zhurnal Prikladnoi Khimii,* v. 27, no. 5, May 1954, p. 473-479.

Effect of individual components of slag and metal. 25 ref. (B21)

200-B. (Book—German.) **(Metallurgy of Ferroalloy Production.) Die Metallurgie der Ferrolegierungen.** R. Durrer and G. Volkert, editors. 1953. Springer-Verlag, Berlin. 72.00 DM (about $16.00).

General principles of metallurgy; construction of furnaces with electrical problems; electrodes; methods of production; and outlook. (B22, Fe-n)

NATIONAL METAL CONGRESS
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November 1-5, 1954

C
Nonferrous Extraction and Refining

119-C. Strategic Metal Out of the North. *Canadian Chemical Processing,* v. 38, Apr. 1954, p. 52, 54, 56.

Equipment, plant layout and processing techniques of Canada's Cobalt Chemicals, Ltd., Photographs, flow sheet. (C general, Co)

120-C. Production of Rare Earth Metals in Quantity Allows Testing of Physical Properties. F. H. Spedding and A. H. Daane. *Journal of Metals,* v. 6, May 1954, p. 504-510.

Preparation of kg. quantities of high-purity lanthanum, cerium, praseodymium and neodymium. Unsuccessful attempts to employ method to prepare yttrium, samarium and gadolinium. Apparatus, techniques and problems encountered. Properties of prepared metals. Photograph, diagram, tables, graphs. 17 ref. (C general, P general, EG-g)

121-C. Copper Slabs Weighing 3000 Lb. Successfully Cast at Raritan Works. C. D. Pearce. *Journal of Metals,* v. 6, May 1954, p. 512-514.

Equipment, plant layout and operating procedures. Photographs, tables. (C5, Cu)

122-C. Mechanism and Rate-Controlling Factors in the Dissolution of Gold in Cyanide Solution. V. Kudryk and H. H. Kellogg. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 541-548.

Factors controlling rate of dissolution of pure gold in cyanide solution studied both directly and through measurement of current-potential curves for anodic and cathodic portions of reaction. Diagrams, graphs. 14 ref. (C24, Au)

123-C. (Hungarian.) **Power Requirements of Aluminum Electrolysis.** Arisztid Czeke. *Kohaszati Lapok,* v. 9, no. 4, Apr. 10, 1954, p. 178-183.

Power losses caused by resistance of the electrolyte, voltages occurring during contact of molten aluminum and electrolyte and possibilities for decreasing power requirements. Tables, graphs. 8 ref. (C23, Al)

124-C. (Russian.) **Behavior of Arsenic and Antimony During Electrolytic Refining of Copper.** L. Ia. Livshits and V. A. Pazukhin. *Zhurnal Prikladnoi Khimii,* v. 27, no. 3, Mar. 1954, p. 298-309.

Electrodeposition observed only when current density exceeds 300 amp. per sq. m. Tables, graphs. 18 ref. (C23, Cu)

125-C. Fractional Fusion. C. H. L. Goodman. *Research,* v. 7, May 1954, p. 168-177.

Recent techniques for purification and homogenization of materials by zonal melting. Possible applications. Graphs, diagrams. 6 ref. (C5)

126-C. (Czech.) **Using Sulfur Monochloride S_2Cl_2 for the Manufacture of Light Metal Alloys and for Processing Aluminum Scrap.** Zdenek Eminger. *Slévarenstvi,* v. 2, no. 1, Jan. 1954, p. 11-14.

Elimination of magnesium from the melt. Diagrams. 3 ref. (C21, Al)

127-C. (Russian.) **Electrolytic Preparation of Ternary Alloys of Nickel With Iron and Molybdenum.** T. F. Frantsevich-Zabludovskaia, I. N. Frantsevich and K. D. Modylevskaia. *Zhurnal Prikladnoi Khimii,* v. 27, no. 4, Apr. 1954, p. 413-420.

Influence of concentration of a neutral salt on change of electrolytic composition during electrolysis. Tables, graphs, micrographs 20 ref. (C23, Ni, Fe, Mo)

128-C. The Separation of Rare Earths by Ion Exchange. VII. Quantitative Data for the Elution of Neodymium. VIII. Quantitative Theory of the Mechanism Involved in Elution of Dilute Citrate Solutions. F. H. Spedding and J. E. Powell. *American Chemical Society, Journal,* v. 76, May 5, 1954, p. 2545-2557.

Distribution of neodymium between Nalcite HCR resin and 0.17 citric acid-ammonium citrate eluent from pH of 5 to 8. Elution process is based on thermodynamics, electrical neutrality and material balance. Tables, graphs. 9 ref. (C28, Nd)

129-C. The Operation of the Flin Flon Smelter and Fuming Plant of the Hudson Bay Mining and Smelting Company, Limited. R. E. Mast and G. H. Kent. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 505, May 1954, p. 328-344; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 208-224.

Equipment and operating procedure. Tables, plant layout, flowsheet, photographs, diagrams. (C21, Cu)

130-C. Preparation of High Purity Lead. Ray C. Hughes. *Electrochemical Society, Journal,* v. 101, June 1954, p. 267-270.

Bismuth and other elements are displaced from lead salt in solution by lead metal. Other impurities are coprecipitated on lead sulfide, converted to metal and finally vacuum distilled. 19 ref. (C22, C25, Pb)

131-C. High Purity Silicon. Felix B. Litton and Holger C. Andersen. *Electrochemical Society, Journal,* v. 101, June 1954, p. 287-292.

Thermal decomposition of silicon tetra-iodide investigated in standard iodide (de Boer) and intermittent flow systems for potential use in preparation of high-purity metal. Graphs, photographs, tables. 21 ref. (C4, Si)

132-C. The Problem of Correct Thermal Insulation of Bottom Linings of Aluminum Furnaces. J. Wleugel and O. C. Böckman. *Electrochemical Society, Journal,* v. 101, June 1954, p. 145C-150C.

Theoretical analysis of operating conditions. Considers current density of anode, furnace voltage and distance between anode and metal bath acting as cathode. Graphs, diagram, table. 10 ref. (C23, Al)

133-C. Non-Ferrous Alloy Ingot Manufacture. W. G. Mochrie. *Institute of British Foundrymen, Proceedings,* v. 46, 1953, p. B21-B29; disc., p. B29-B30.

Equipment and practices in production of ingots for foundry use. Table, photographs. (C5, E general)

134-C. Zinc Smelting. *Metal Industry,* v. 84, May 14, 1954, p. 429-432.

Production of zinc, sulfuric acid and sweet roasted concentrates (oxides). Photographs, diagrams, table. (C21, Zn)

135-C. (French.) **The Problem of Ultimate Traces of Impurities in Metals.** Georges Chaudron. *Bulletin de la société chimique de France,* 1954, no. 4, Apr., p. 419-422.

Application of zone melting method to super-refinement of aluminum. Obtaining pure iron by electrolysis. Tables, graphs. 10 ref. (C5, D8, Fe, Al)

136-C. (Russian.) **Vacuum Dezincing of Lead-Zinc Alloys.** D. M. Chizhikov and M. P. Smirnov. *Zhurnal Prikladnoi Khimii,* v. 27, no. 5, May 1954, p. 514-526.

Advantages of vacuum distillation for accelerating zinc condensation. Tables, graphs, diagrams. 4 ref. (C25, C22, Pb, Zn)

D

Ferrous Reduction and Refining

254-D. **Construction of the Largest Blast Furnace in Europe Completed in Record Time.** David R. Knall. *Blast Furnace and Steel Plant,* v. 42, May 1954, p. 524-530.

Design and installation of plant in Dortmund, Germany. Diagrams, photographs. (D1)

255-D. **The Use of Oxygen in the Iron and Steel Industry. Steelmaking in the Converter Using Oxygen. II.** Georg Bulle. *Blast Furnace and Steel Plant,* v. 42, May 1954, p. 531-536.

Definite advantages with increased production. Diagrams, photograph. (D3)

256-D. (French.) **Non-Manganese and Semi-Manganese Pig Irons. Technical and Economic Comparison of Use in Basic Bessemer Converter.** Rajon and Tavard. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* 1954, no. 3, p. 549-560.

Studies ordinary steels prepared by addition of ferromanganese with 75% Mn. Effect of consumption of ferromanganese, lime, scrap, sodium carbonate and pig iron on linings. Influence of increase of manganese content in pig on quality of steel. Graphs, tables. (D3, CN)

257-D. (Italian.) **Problems of Solidification and Segregation in Killed and Unkilled Steels.** Bernhard Matuschka. *Metallurgia italiana,* v. 46, no. 2, Feb. 1954; *Atti notizie (AIM),* v. 9, no. 2, Feb. 1954, p. 50-58; disc., p. 58-60.

Systematic study of ingot defects and their control. Graphs, photographs, micrographs, diagrams. (D9, ST)

258-D. (Russian.) **Electrolysis of Liquid Iron Containing Slags.** O. A. Esin and P. M. Shurygin. *Doklady Akademii Nauk SSSR,* v. 94, no. 6, Feb. 21, 1954, p. 1145-1147.

Method of cathodic reduction. Diagrams, graph. 7 ref. (D8, Fe)

259-D. (Russian.) **Investigation of the Distribution of Gaseous Flow in a Blast Furnace Using a Model.** N. N. Chernov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 1, Jan. 1, p. 80-91.

Design of model and method of study on experimental installations. Tables, diagrams, graph. 3 ref. (D1)

260-D. **Electric Furnace Operation.** F. S. Leigh. *Iron & Steel,* v. 27, May 1954, p. 169-174.

Trends in modern design. Considers electrodes, fume disposal, magnetic stirrer and special-purpose furnaces. Photographs, diagram, oscillogram. (D5)

261-D. **Iron and Steel Making Processes Used in Sweden.** Sven Fornander. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 1-12.

Various processes for making pig iron, sponge iron and ingot steel. Emphasis on scarcity of fossil fuel and relatively large resources of hydro-electric power. Maps, graphs, photograph, tables, diagrams. 56 ref. (D general, Fe, ST)

262-D. **Reduction of Iron Ore Without Melting in a Rotary Furnace.** Bo Kalling and Folke Johansson. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 76-85.

Construction and results of new type furnace and its possibilities in steelmaking. Diagrams, photographs, tables. 6 ref. (D8, Fe)

263-D. **Correlating Blast Furnace Operating Concepts.** Charles Agnew. *Steel,* v. 134, May 17, 1954, p. 106 + 4 pages.

Generation, distribution, recovery and use of heat are important factors governing proper coke combustion. Table, photographs. 4 ref. (D1)

264-D. (French.) **Committee of Engineers for Basic Bessemer and Other Furnaces. Storage Tests in Cowper Apparatus.** *Centre de Documentation Siderurgique, Circulaire d'informations Techniques,* v. 11, no. 4, 1954, p. 721-734.

Results of tests on Brohlthal and Petit a Senelle cowpers. Graphs, tables, diagrams. (D3)

265-D. (French.) **Committee of Engineers for Basic Bessemer Steel Mills. I. Oxygen-Enriched Blasting Tests at Moyeuvre.** Trentini. **II. Mechanism of the Fertilizing Action of Basic Bessemer Slags.** Barbier. **III. Dilling's Tests on Oxygen-Enriched Blasts.** Buey. **IV. Some Remarks on the Production of Converter Bottoms.** Delong. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 11, no. 4, 1954, p. 753-769.

Industrial possibilities offered by enriched blast. Tables, graphs, photographs. (D3, ST)

266-D. (French.) **Committee of Engineers for Open-Hearth Furnaces. Control of Slag in the Basic Open-Hearth Furnace.** Bernard. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 11, no. 4, 1954, p. 771-778.

Relationship between composition of slag, elimination of carbon, phosphorus and sulfur and recovery of manganese. (D2, AY)

267-D. (French.) **The Investigation of Heterogeneity of Forging Ingots.** M. Nepper. *Revue universelle des mines,* v. 10, ser. 9, no. 4, Apr. 1954, p. 96-99.

Relationship between shape and degree of heterogeneity established in 20-ton bessemer carbon steel ingots. Table, photographs, diagrams. (D3, D9, CN)

268-D. (German.) **The Oxygen Contents of Molten Steels From the Basic Converter, Openhearth and Electric Furnace.** Karl Georg Speith and Hans vom Ende. *Stahl und Eisen,* v. 74, no. 9, Apr. 22, 1954, p. 509-525.

Steel blown with air, 30% oxygen and pure oxygen. Dependence on composition of slag and alloy content. Graphs, tables. 83 ref. (D3, D2, D5, ST)

269-D. (German.) **Repair of Basic Openhearth Furnaces With Machines. I. Patching With Blaw-Knox Machines.** Wolfgang Schleicher. **II. Operation of Brieden Type Dolomite Guns.** Ewald Friemann and Günter Evers. **III. The BRI Dolomite Sprayer.** Max Hauck. **IV. Repairing With the Blaw-Knox Machine.** Heinrich Clees. *Stahl und Eisen,* v. 74, no. 10, May 6, 1954, p. 620-623.

Includes photographs, diagram, table. (D2)

270-D. (German.) **Reconstruction of Four Blast Furnaces in the Salzgitter Smelting Plant.** Wilhelm Ingenerf. *Stahl und Eisen,* v. 74, no. 10, May 6, 1954, p. 649-651.

Changes during repair of American-designed furnaces. Diagrams, photograph. (D1)

271-D. **Effect of Physical and Chemical Properties of Coke on Its Combustion.** R. A. Mott. *Coke and Gas,* v. 16, May 1954, p. 189-194.

Principles underlying combustion in blast furnace. Graphs, tables. 17 ref. (D1)

272-D. **The Electric Furnace West of the Rockies.** W. B. Wallis. *Iron and Steel Engineer,* v. 31, May 1954, p. 80-86.

Low cost advantages of electric furnace compared to openhearth. Graphs, photographs. (D5, D2)

273-D. **The Manufacture of Rimming Steels.** H. N. Bowen. *Iron and Steel Institute; Papers of the Affiliated Local Societies, Special Report no.* 49, Feb. 1954, p. 9-21.

Furnace, raw materials, desulfurization and effects of various factors on refining. Tables, photographs, diagrams, graph. 4 ref. (D2, ST)

274-D. **Some Factors Affecting Open-Hearth Steelplant Performance.** J. S. Curphey. *Iron and Steel Institute; Papers of the Affiliated Local Societies, Special Report no.* 49, Feb. 1954, p. 43-54.

Importance of shop and stockpile layout, effect of increasing proportion of hot metal in furnace charges, slag bulk and flushing practice and factors affecting efficiency of fuel combustion. Charts, diagrams, tables. (D2, ST)

275-D. **Scale Additions Reduce Phosphorus and Nitrogen in Basic Bessemer Steel.** (Digest of "Development at Corby of Basic Bessemer Steel Low in Nitrogen and Phosphorus by Scale Additions During the Blow", by W. A. Smith; *Journées Internationales de Sidérurgie,* 1953, Apr., p. 547-562.) *Metal Progress,* v. 65, June 1954, p. 146 + 4 pages.

Low-grade high-phosphorus ores used economically with this process. (D3, ST)

276-D. **Comparison of Costs in Openhearth and Electric Furnace Shops.** (Digest of "Comparative Economics of Openhearth and Electric Furnaces for Production of Low-Carbon Steel", by S. L. Case, D. D. Moore, C. E. Sims and R. J. Lund; *Electric Furnace Survey Group and Bituminous Coal Research, Inc.* Published by Bituminous Coal Research, Inc., Pittsburgh.) *Metal Progress,* v. 65, June 1954, p. 174-176.

Comparative cost and operating features of modern openhearth and electric furnaces of equal output. Table. (To be continued.) (D2, D5)

277-D. **Sponge Iron and Direct-Iron Processes.** Edward P. Barrett. *U. S. Bureau of Mines Bulletin* 519, 1954, 143 p.

Laboratory and commercial experience. Conditions under which processes may be practical. Tables, diagrams, photographs, graphs. 451 ref. (D8, Fe)

278-D. (French.) **Oxygen Combustion Tests on an Openhearth Furnace Fired With Enriched Coke-Oven Gas.** G. Husson and J. Donney. *Revue de métallurgie,* v. 51, no. 4, Apr. 1954, p. 283-290; disc., p. 290.

Increased production and fuel economy. Wear on refractories. Diagrams, tables, photographs. (D2)

279-D. (Swedish.) **The Mechanism of Reduction of Magnetite and Hematite.** John Olof Edström. *Jernkontorets Annaler,* v. 138, no. 4, 1954, p. 177-224.

Low strength of pure hematite ores and of well-oxidized, burnt, rich-ore pellets during reduction with carbon monoxide due to pore formation, expansion and disintegration of

structure. Tables, graphs, micrographs, diagram. 68 ref. (D general, Fe)

280-D. (Book.) **Ferrous Process Metallurgy.** John L. Bray. 414 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $6.50.

Covers raw materials; steel making furnaces and processes; and ingot practice. (D general)

E

Foundry

342-E. Running and Feeding of Sand Castings. R. W. Ruddle. *Foundry Trade Journal,* v. 96, Apr. 29, 1954, p. 489-495; disc., p. 495-497.

Technology of feeders, chills and gates. Diagrams, table. 14 ref. (E23)

343-E. Casting Stainless Steel and Other Alloys in Shell Moulds. *Machinery (London),* v. 84, Apr. 23, 1954, p. 853-861.

Equipment, patterns, dump box and processes, including curing, stripping and coremaking. Photographs. (E16, SS)

344-E. Pressure Die-Castings in Zinc Alloy. Frank G. Woollard. *Metal Industry,* v. 84, Apr. 30, 1954, p. 364-365.

Specifications, code of practice and certification scheme in Britain. Photographs. (E13, Zn)

345-E. The British Bronze and Brass Foundry Industry. W. R. Marsland. *Metal Industry,* v. 84, Apr. 30, 1954, p. 367-368.

Present practices. Photographs. (E general, Cu)

346-E. The 1954 Die Casting Program. David S. Laine. *Precision Metal Molding,* v. 12, May 1954, p. 34-36, 84-86.

Compares use of zinc and aluminum in various industries. Tables. (E13, Zn, Al)

347-E. Take a Good Look at Shell Mold Casting. William S. Thomas. *Precision Metal Molding,* v. 12, May 1954, p. 44-45, 101-102.

Eleven advantages to expect from castings. Materials, equipment and methods used. Photograph. (To be continued.) (E16)

348-E. Alloy Steel Castings. John M. Quinn. *Product Engineering,* v. 25, May 1954, p. 129-131.

Cooperation between designer and foundry engineer emphasized. Photographs. (E general, AY)

349-E. (French.) **Improving Permeability of Fine Sand by Addition of Large-Grain Sand.** Pierre Nicolas. *Fonderie,* 1954, Mar. no. 98, p. 3872-3873.

Brief statistical study shows inadvisability of additions. Tables, charts. (E18)

350-E. (French.) **Practical Advice to Foundrymen.** *Fonderie,* 1954, Mar., no. 98, p. 3874-3877.

Deoxidation of cast iron, recovery of metallic wastes contained in molding sand in the copper alloys foundry and types of bronze usable in food industry. Magnetic cast iron. Diagrams. (E general, CI)

351-E. (German.) **Plant Experiences With Hot-Blast Cupola Furnace of Esslingen Design.** H. Kopp. *Giesserei,* v. 41, no. 8, Apr. 15, 1954, p. 186-193.

Advantages of hot blast melting utilized without preheating. High efficiency, shown by waste gas tests and lower coke consumption, improves quality. Diagrams, photographs, table, graphs. 9 ref. (E10, CI)

352-E. (German.) **Three Years of Cast Iron With Spherical Graphite in Western Germany.** Kurt Figge. *Giesserei,* v. 41, no. 8, Apr. 15, 1954, p. 193-198.

Data on melting furnaces, materials, magnesium process, properties and uses. Shows spheroidal cast iron can be produced economically. Tables, photographs, graphs, micrographs. 7 ref. (E11, CI)

353-E. (German.) **Pressure Casting by Compressing the Molten Metal Die.** K. Wittmoser. *Giesserei,* v. 41, no. 8, Apr. 15, 1954, p. 205.

Design and operation of highly efficient and accurate pressure casting mold. Diagram. 2 ref. (E13)

354-E. (German.) **Computing Dimensions of Down Gate and Sprue Cup.** *Giesserei,* v. 41, no. 8, Apr. 15, 1954, p. 207-208.

Simplified method for design. Diagrams. (E22)

355-E. (German.) **Production of Switch Boxes by Chill-Mold Aluminum Casting.** *Giesserei,* v. 41, no. 8, Apr. 15, 1954, p. 208-209.

Three chill mold designs for casting to close specifications. Diagrams. (E12, Al)

356-E. (German.) **Cerium-Cerium Alloys and Cerro Alloys.** Bruno Waeser. *Werkstoffe und Korrosion,* v. 5, no. 4, Apr. 1954, p. 137-138.

Use of cerium in production and working of spheroidal cast iron as a protective agent and catalyst. Properties of Cerrobase, Cerrobend, Cerromatrix and Cerrotru alloys. Tables. 16 ref. (E25, EG-g, CI)

357-E. (Hungarian.) **Data on the Surface Porosity of Steel Castings.** Karoly Börzsönyi. *Öntöde,* v. 5, no. 4, Apr. 1954, p. 73-78.

Causes and possibilities of control by more careful degassing of the steel melt. 6 ref. (E25, CI)

358-E. (Hungarian.) **Industrial Results in the Production of Modified Black Malleable Cast Iron.** Janos Lajtay. *Öntöde,* v. 5, no. 4, Apr. 1954, p. 79-84.

Type of furnace, structures and application. Photographs, tables, graphs, micrographs. (E10, M26, CI)

359-E. (Hungarian.) **Silicon Esters and Their Application in the Foundry.** Ivan Lipovecz. *Öntöde,* v. 5, no. 4, Apr. 1954, p. 84-88.

Use in casting technology. Diagrams. 8 ref. (E18)

360-E. (Hungarian.) **Investigation of Some Hungarian Natural and Synthetic Sands for Magnesium Casting.** Gyula Emöd and Pal Németh. *Öntöde,* v. 5, no. 4, Apr. 1954, p. 88-94.

Properties of various mixtures of synthetic and natural Hungarian sands. Graphs, tables, micrographs. 7 ref. (E18, Mg)

361-E. (Hungarian.) **Talc as a Graphite Substitute for Mold Coating.** Imre Abaffy. *Öntöde,* v. 5, no. 4, Apr. 1954, p. 94-96.

Properties of optimum coating substances. (E19)

362-E. The Influence of Mould Factors on Casting Defects. J. H. Gittus. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Apr. 1954, p. 264-277 + 1 plate.

Effects of dimensions and composition of metal and mold on change in length of test castings during solidification. Diagrams, graphs, tables, photograph. 14 ref. (E19, CI)

363-E. Behaviour of Sand Mixtures Under Load at Room and Elevated Temperatures. R. G. Godding and R. Rew. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Apr. 1954, p. 278-295 + 4 plates.

Apparatus designed and constructed to obtain stress-strain curves on dried compression test pieces of molding sand at room and elevated temperatures. Graphs, diagrams, tables, photographs. (E18)

364-E. Foundry Uses of Carbon and Graphite. E. R. Landry. *Canadian Metals,* v. 17, May 1954, p. 28, 30, 32.

Ferrous and nonferrous foundry applications of carbon and graphite, based on singular combination of chemical, physical and electrical properties. (E general)

365-E. Foundry Practice. VI. Mould Drying and Core Baking. VII. Closing and Pouring the Moulds. W. H. Solmon and Eric N. Simons. *Edgar Allen News,* v. 33, May 1954, p. 107-108.

Industrial methods. (To be continued.) (E19, E21)

366-E. Synthetic Resins in Core-Bonding. W. Andrews. *Foundry Trade Journal,* v. 96, May 6, 1954, p. 521-524; disc., p. 524-527.

General summary of outstanding features of resin corebinders. Graphs, table. (E18)

367-E. Steelmaking for the Steel Foundry. J. Blackburn. *Foundry Trade Journal,* v. 96, May 13, 1954, p. 549-557.

Melting units and their advantages. Processes and procedures of temperature measurement and control and pouring. Photographs, table, diagram, graph. (E10, CI)

368-E. Die Castings v. Sinterings. H. K. Barton. *Machinery (London),* v. 84, Apr. 30, 1954, p. 918-923.

Studies both processes. Graphs, diagrams, tables. (E13, H general)

369-E. Product Design for Easy Assembly. George Dittrich. *Precision Metal Molding,* v. 12, May 1954, p. 40-41.

Five zinc die castings designed so that little or no machine work is needed. Photographs. (E13, Zn)

370-E. (Czech.) **Experience With Inserts Behind Risers in Steel Castings.** Vitezslav Batek. *Slévarenstvi,* v. 2, no. 1, Jan. 1954, p. 14-17.

Design, advantages and application. Diagrams, photographs. (E22, CI)

371-E. (Czech.) **Heavy Ilgner Wheel Castings.** Vaclav Batek. *Slévarenstvi,* v. 2, no. 2, Feb. 1954, p. 46-48.

Method of casting heavy fly wheels. Shrinkage cavities and open-grain defects. Diagrams. (E11)

372-E. (Czech.) **Rammed Lining for Cupola Furnace.** Josef Kuklinek. *Slévarenstvi,* v. 2, no. 2, Feb. 1954, p. 48-50.

Economy and chemical analysis. Diagram. (E10)

373-E. (Czech.) **Chilled Cast Rolls.** Otto Necas. *Slévarenstvi,* v. 2, no. 2, Feb. 1954, p. 34-43; no. 3, Mar. 1954, p. 71-74.

Chemical composition, structure, thickness of chilled layer and surface hardness. Production methods from molding to heat treatment. Tables, graphs, micrographs, diagrams. 26 ref. (E general, J general, CI)

374-E. (Czech.) **Experiences With the Production of a 105-Ton Steel Casting Press Stand.** J. Janousek. *Slévarenstvi,* v. 2, no. 3, Mar. 1954, p. 74-81.

Production methods. Diagrams, photographs, graphs. (E11, ST)

375-E. (Czech.) **Casting of a 21-Ton Gray Iron Anvil.** Frantisek Lakomy. *Slévarenstvi,* v. 2, no. 3, Mar. 1954, p. 81-82.

Production methods, use of knockoff riser and special care of material and method of pouring. Diagrams. (E11, E22, E23)

376-E. (Czech.) **Burning-On of Molding Materials on Castings.** Lev Petrzela. *Slévarenstvi*, v. 2; *Prace Ceskoslovenského Vyzkumu Slévarenského*, v. 1, no. 1, Feb. 1954, p. 1-12.

Method of testing. Effect of carbon additions to sand, mold and core coatings. Evaluation of results by comparison. Diagrams, micrographs, tables. 48 ref. (E11, E19, E21)

377-E. Development of a West Coast Steel Jobbing Foundry. Herbert F. Scobie. *American Foundryman* v. 25, June 1954, p. 59-63.

Growth of foundry and production facilities. Photographs, diagram. (E general, CI)

378-E. Induction Melting With High and Low Frequency. Frank T. Chesnut. *American Foundryman*, v. 25, June 1954, p. 70-74.

Aids to furnace selection for particular needs. Photographs, diagram. (E10)

379-E. Olivine-Silica Molding Sands. William A. Snyder and Gilbert S. Schaller. *American Foundryman*, v. 25, June 1954, p. 75-81.

Experiments to determine if sand mixtures would soften, develop swells or fuse at interface. Photographs, tables, diagrams. 11 ref. (E18)

380-E. Experiences With Plastics in Patternmaking Practice. W. C. H. Dunn. *American Foundryman*, v. 25, June 1954, p. 82-84.

Can be used for patterns, core boxes and for coating wood patterns to achieve wear resistance. Photographs. (E17)

381-E. Foundry Facts. *American Foundryman*, v. 25, June 1954, p. 85-86.

Data sheets for calculating cupola charges. Tables. (E10, CI)

382-E. A 200-Ton Spring Balance. *Engineering*, v. 177, May 14, 1954, p. 626.

Largest spring balance in world weighs large castings for costing purposes. Diagram, photographs. (E general)

383-E. Casting Buying vs Buying Castings. Oscar P. Ketter. *Foundry*, v. 82, June 1954, p. 102 + 13 pages.

Successful relationships between producers and buyers depend on understanding. Casting purchase records. Analysis of scrap costs and causes. Table, diagram, photographs. (E general, A4, CI)

384-E. Cutting Refractory Costs in Producing Malleable Iron. Albert S. Johnson. *Foundry*, v. 82, June 1954, p. 106 + 4 pages.

Types of firebrick and wall construction for air furnaces. Diagrams, table. (E10, CI)

385-E. Solidification, Feeding Characteristics of Gray and Nodular Irons. R. P. Dunphy, C. G. Ackerlind and W. S. Pellini. *Foundry*, v. 82, June 1954, p. 108 + 13 pages.

Microfeatures of solidification and wall growth characteristics. Feeding practices, carbide blocking of feed paths and shrinkage void formation. Diagrams, graphs, photographs, radiograph. 7 ref. (E25, E23, CI)

386-E. pH Value of Molding Sands. Victor E. Zang and Gerald J. Grott. *Foundry*, v. 82, June 1954, p. 116 + 6 pages.

Better castings made by pH control of the colloid binders in molding sand. Effect of chemicals and clays. Photographs, graphs, table. 2 ref. (E18)

387-E. Pelleted Foundry Pitch. E. Brett Davies, T. F. N. Matthews and G. Smart. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. A71-A76; disc., p. A76-A78.

British practice in use of powdered coal-tar pitch in molding sand. Photomicrograph, graphs, tables, photographs. (E18)

388-E. Effect of Heat on Clays and Its Bearing on the "Life" of Clay Bonds. S. Davison and J. White. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. A79-A98; disc., p. A98-A100.

Behavior of clays at metal casting temperatures. Graphs, tables, diagram. 33 ref. (E18)

389-E. Production of Diesel-Engine Castings in Grey Iron. J. R. Charlton. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. A131-A139; disc., p. A139-A141.

Methods of producing large castings in foundry equipped for only small castings. Photographs, tables. (E11, CI)

390-E. Effect of Pouring Conditions on Shrinkage Unsoundness in Bronze Ingots Cast in Metal, Carbon or Sand Moulds. W. T. Pell-Walpole. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. A175-A182; disc., A182-A183.

Effects of rate and temperature of pouring. Optimum rates for various conditions. (E23, Cu)

391-E. Casting Design in Relation to Production. J. H. Pearce and G. D. Whitehouse. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B1-B7.

Importance of proper design and production methods in making castings more economical and satisfactory than weldments or forgings. Photographs, drawings. (E general, CI)

392-E. Pressure-Cast Aluminium Pattern Equipment. D. H. Potts. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B8-B14; disc., p. B15-B20.

Advantages and range of types of aluminum pattern equipment. Photographs, diagram. (E17, Al)

393-E. Core-Assembly as a Production Aid to the Jobbing Founder. E. H. Beech and J. Hoyes. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B31-B45.

Practical means of increasing production and reducing foundry costs. Photographs. (E21)

394-E. Runners and Risers. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B46-B49.

Symposium including "Runners and Risers for Steel Castings", E. Daybell; "Runners and Risers for Iron Castings", P. A. Russell; and "Runners and Risers for Non-Ferrous Castings", R. W. Ruddle. (E22, CI)

395-E. Design, Installation and Operation of a Water-Cooled Cupola. J. W. Dews. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B60-B66; disc., p. B67-B68.

Reasons for adoption. Experiences with 24-in. diameter cupola running for 8-hr. melts. Drawings, photographs. (E10)

396-E. The "C" Process of Casting. M. C. Dixon and R. S. Bushnell. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B69-B78; disc., p. B78-B80.

General outline of British practice in shell molding. Photomicrographs, photographs, graph, table. (E16)

397-E. Economical Use of Metals in the Foundry. D. W. Hammond. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B81-B90; disc., p. B90-B91.

Conservation of raw materials and conversion of swarf and borings into useful metal. Tables, photographs, drawings. (E general, A8)

398-E. Grain-Refinement and Its Effect in Non-Ferrous Casting Alloys. A. Cibula. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B92-B100.

Influence of grain size on casting and mechanical properties of nonferrous alloys. Recent developments in refinement of aluminum and copper-base alloys. Photographs, graphs, micrographs. 45 ref. (E25, Q general, Al, Cu)

399-E. Mechanized Foundry for Small Blackheart Malleable Castings. J. Roxburgh. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B101-B111.

Outlines general practices and compares with production of grey iron. Diagram, photographs. (E11, CI)

400-E. Mould Reaction. R. W. Ruddle. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B112-B119; disc., p. B119-B122.

Dangers and possible benefits of mold reaction in nonferrous castings. Photographs, graphs, diagrams. 7 ref. (E19, EG-a)

401-E. Castings for the Smithy and Forge. W. S. Spenceley. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B123-B132.

Practice in producing casting for subsequent forging. Photographs. (E11, CI)

402-E. Surface Finish and Facing Sands. Roy Pell. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B133-B139; disc., p. B139-B142.

Selection and treatment of sand to produce better finish on ferrous castings. Diagrams, graph, table, photographs. (E18, CI)

403-E. Knock-Off Feeding Heads. J. R. Robinson. *Institute of British Foundrymen, Proceedings*, v. 46, 1953, p. B143-B149.

Use of exothermic core compounds and the Connor block to provide easy to remove heads. Photographs. (E23)

404-E. Improved Closing Methods Cut Shell Casting Costs. M. L. Katz and S. B. Donner. *Iron Age*, v. 173, June 3, 1954, p. 113-115.

New methods of closing and securing shell molds. Thermoplastic resin wood glue satisfactory for rapid shell closing. Photographs. (E16)

405-E. Scientific Method in Industry. I. Shell Moulding. M. J. Sargeaunt. *Machinery Lloyd (Overseas Ed.)*, v. 26, May 8, 1954, p. 70 + 9 pages.

Simple physical concepts can be used in analysis of most industrial processes. Advantages. Tables, graphs. (E16)

406-E. Problems and Procedures in Proving Die Casting Dies. W. M. Halliday. *Metallurgia*, v. 49, no. 295, May 1954, p. 230-234.

Importance and details of checks made. (E13)

407-E. Upgrading Strength, Quality of Aircraft Castings Needed. Alfred H. Petersen. *Western Metals*, v. 12, May 1954, p. 49-51.

Greatest future need will be for large complex castings, ferrous and nonferrous, having a uniform degree of soundness and mechanical properties approaching those of wrought metals. Table, diagrams, graph, photograph.

(E general, Q general, T24)

408-E. (Czech.) **Casting of Motorcycle Cylinders.** Ladislav Matuscik. *Slévarenstvi*, v. 2, no. 4, 1954, p. 108-113.

Various methods for securing sound castings. Photographs, diagrams, graphs, tables.
(E general, CI)

409-E. (Czech.) **Internal Casting Quality.** J. Pribyl. *Slévarenstvi*, v. 2; *Prace Ceskoslovenského Vyzkumu Slévarenskénho*, v. 1, no. 4, 1954, p. 29-36.

Importance of temperature gradient during solidification. Effect of casting design, gating, risering, and combination of molding materials. Tables, diagrams, photographs, graphs. 21 ref. (E25, E22, E19)

410-E. (German.) **Compound Lead-Bronze Casting for Maximum Strength.** F. Vollmert. *Giesserei*, v. 41, no. 9, Apr. 29, 1954, p. 232-234.

Variations of dipping process in which steel bearing sleeves are immersed into molten material and suddenly quenched. Diagrams. 3 ref. (E16, Pb, Cu)

411-E. (Book.) **European Foundries and Productivity: Some Recent Experiments and Achievements.** (Technical Assistance Mission No. 122). 168 p. 1953. Organization for European Economic Cooperation, 2, rue André-Pascal, Paris. 700 fr. H. M. Stationery Office, London. 14s.

Record of papers and discussions at First European Seminar on foundry productivity, held at Paris in Nov. 1952. Methods adopted, difficulties encountered, current trends, and improvements already introduced into European foundry industry as a result of national and international technical assistance missions sent to study American foundry productivity, and the visits made by American experts to Europe.
(E general)

412-E. (Book.) **Institute of British Foundrymen, Proceedings,** (Annual Volume), v. 46, 1953. 416 p. Institute of British Foundrymen, Saint Johns Street Chambers, Deansgate, Manchester, 3, England.

Includes 30 papers on various phases of foundry practice. Papers individually abstracted.
(E general)

413-E. (Book—Russian.) **The Repairing of Defective Castings.** N. N. Smelyakov and N. F. Kosarikov. 220 p. 1950. Government Scientific-Technical Publishing House, Moscow.

Welding, soldering, and surface treatments for steel, cast iron, and nonferrous metals.
(E general, ST, CI)

414-E. (Book—Russian.) **Steel Castings.** P. F. Vasilevski. 405 p. 1950. Government Scientific-Technical Publishing House, Moscow.

Foundry text containing no physical metallurgy, but treating technology of pattern and mold design, pouring, gating, and risering.
(E general, CI)

F

Primary Mechanical Working

205-F. Powering the Fairless Works Two-Stand Tin Temper Mill. C. H. Legler. *Blast Furnace and Steel Plant*, v. 42, May 1954, p. 521-523.

Design of drive mechanism for high-speed mill. Photographs, diagrams. (F23, CN)

206-F. The Big Squeeze. Earl Bush. *Instrumentation*, v. 7, no. 3, 1954, p. 4-6.

How Ugine-Sejournet extrusion process uses instrumentation to assure uniform billet temperatures. Photographs. (F24, ST)

207-F. Titanium Successfully Hot Extruded. II. K. A. Wilhelm and G. A. Moudry. *Iron Age*, v. 173, May 13, 1954, p. 126-129.

Extrudes better than steel. Die filling is improved, surface finish is good and die wear less. Dimensional tolerances for titanium extrusions will probably be comparable to present tolerances for hard aluminum alloy extrusions. Micrographs, graph, photographs.
(F24, Ti)

208-F. The Diversity of Products of Low Individual Tonnages. W. J. McClung. *Iron and Steel Engineer*, v. 31, Apr. 1954, p. 101-104.

General problem of wide variety of rolled sizes, shapes and grades involving low individual tonnage requirements. (F23, ST)

209-F. Stainless Steel Wire Properties Are Affected by Draw Speed. Samuel Storchheim. *Wire and Wire Products*, v. 29, May 1954, p. 522-523, 564-567.

Effects of cold reduction on properties of wire. Graphs, tables.
(F28, SS)

210-F. (Hungarian.) **Modern Drop Forging of Crankshafts.** Lajos Metes. *Kohaszati Lapok*, v. 9, no. 2, Feb. 1954, p. 72-73.

Advantages and methods of preforming pieces to be forged. Savings in raw material and better formation of flow lines. Photographs.
(F22, ST)

211-F. (Hungarian.) **Steels for Drop Forging. II.** Erno Weigl. *Kohaszati Lapok*, v. 9, no. 4, Apr. 10, 1954, p. 154-161.

Properties, composition and application of plain carbon and nickel steels for hot drop forging. Tables, graphs. (F22, CN, AY)

212-F. (Polish.) **Drop Forging Hammers.** Wieslaw Wroblewski. *Hutnik*, v. 21, no. 2, Feb. 1954, p. 41-48.

Advantages, limitations and various types of hammers. Power and impact forces. Diagrams, table.
(F22)

213-F. The Theory and Practice of Wire Drawing. II. Researches Concerning Wire-Drawing Dies. J. G. Wistreich. *Australasian Engineer*, 1954, Mar. 8, p. 61-66.

Recent investigations concerning die pressure, temperature, lubrication and wear. Methods of industrial control. Diagrams, tables. 66 ref. (F28)

214-F. 7,000-Ton Forging Press. Hans Ulmann. *Engineering Journal*, v. 37, May 1954, p. 557-563.

Designed for production of large ingots and billets, as well as for forming heavy plate. Photographs, diagram. (F22, ST)

215-F. Accurate Furnace Control Required in Processing of High Speed Steels. F. A. Locke. *Industrial Heating*, v. 21, May 1954, p. 915-916, 918, 920.

Equipment for processing from ingot to final bar to avoid decarburization. (F21, TS)

216-F. Calculation of Roll Pressure and Energy Consumption in Hot-Rolling. Gunnar Wallquist. *Iron and Steel Institute, Journal*, v. 177, May 1954, p. 142-158.

Calculation may be based on mathematical analysis or on empirical values obtained experimentally. Table, diagrams, photographs, graphs. 43 ref. (F23, ST)

217-F. Design Value of Extruded Steel. S. O. Evans. *Machine Design*, v. 26, May 1954, p. 294-296, 299.

Abridged from "Steel Extrusion and Its Value to the Designer" presented at SAE National Passenger Car Body & Materials Meeting, Detroit, Mich., Mar. 1954. Mechanical limits, dimensional tolerances and economic considerations. Diagram. (F24, ST)

218-F. The Forming of Aluminum Sheet. V. Drop-Hammer Forming. H. Hinxman. *Sheet Metal Industries*, v. 31, no. 325, May 1954, p. 367-371, 377.

Economy of cost and time achieved. Tools, dies and technique. Photographs, diagram. (To be continued.) (F22, Al)

219-F. The Rolling of Metals and Alloys. I. Historical Development of the Rolling Mill. Eustace C. Larke. *Sheet Metal Industries*, v. 31, no. 325, May 1954, p. 411-425.

Advantages associated with the use of small-diameter working rolls. Tables, photographs, diagrams. 19 ref. (To be continued.) (F23)

220-F. How to Hot Work Titanium. C. I. Bradford. *Steel*, v. 134, May 24, 1954, p. 100-101.

Ability to be worked with conventional steel mill equipment is largely responsible for rapid industrial growth. Photographs.
(F general, Ti)

221-F. Trends in Modern Forging. Robert G. Friedman. *Steel Processing*, v. 40, May 1954, p. 285-294, 331.

Improvements in hot and cold forging techniques. Photographs.
(F22)

222-F. (German.) **Fibrous Fracture and Piping in Extrusions.** A. Rühenbeck. *Metall*, v. 8, nos. 9-10, May 1954, p. 363-365.

Comparative strength tests and metallographic investigations on Al-Cu-Mg and Al-Cu-Mg-Pb alloys to determine cause of defects. Tables, photograph, micrographs.
(F24, Q26, Al, Cu)

223-F. Improvements in the Manufacture of Transformer Sheet. I. H. H. Meyer and H. Schlüter. *Engineers' Digest*, v. 15, May 1954, p. 199-202. (From *Stahl und Eisen*, v. 73, no. 26, Dec. 17, 1953, p. 1706-1717.)

Previously abstracted from original. See item 87-F, 1954.
(F23, D general, J23, ST)

224-F. A New Theory of Hot Rolling. George S. Mican. *Iron and Steel Engineer*, v. 31, May 1954, p. 55-71; disc., p. 72-79.

Tearing tendency, roll wear, roll breakage and power consumption reduced by knurled roll surface. Diagrams, photograph, tables, graphs. 15 ref. (F23, ST)

225-F. New Soaking Pit Facilities at Steel Division of Ford Motor Company. B. D. Barns and H. E. Raaflaub. *Iron and Steel Engineer*, v. 31, May 1954, p. 109-112; disc., p. 112-114.

Space problems encountered in expansion and steps taken to relieve them. Photographs. (F21, ST)

226-F. Aluminium Wire Manufacture. *Metal Industry*, v. 84, May 14, 1954, p. 416-418.

Production of aluminum and alloy rod and wire for engineering, aircraft and electrical industries. Complete range of bare aluminum conductors for overhead transmission and distribution of electricity. Photographs. (F27, F28, Al)

227-F. Aluminium Rolling, Extrusion and Drawing. M. J. Crowley, *Metal Industry*, v. 84, May 14, 1954, p. 419-420.

Production processes of plant manufacturing strong light alloys. Photographs. (F23, F24, G4, Al)

228-F. Copper, Brass and Zinc Rolling. *Metal Industry*, v. 84, May 14, 1954, p. 421-422.

Melting, refining, casting and rolling facilities of a particular plant. Photographs. 1 ref. (F23, Cu, Zn)

229-F. Wrought Light Alloys. R. T. Raven. *Metal Industry*, v. 84, May 14, 1954, p. 433-435.

Wrought alloys of aluminum and magnesium produced in forms of sheet, strip, extrusions, rod, bar, tube and wire. Photographs. (F general, Al, Mg)

230-F. Extruded Blades. *Metal Progress,* v. 65, June 1954, p. 100-101.

Advantages favoring extruded over welded fabrication of propeller blades include greater strength and resistance to fatigue, lower production cost and greater output. Drawings. (F24)

231-F. Minimizing Cost of Forgings Requires Right Combination of Men, Materials, Machines. Holloway Kilborn and R. T. Herdegen, Jr. *SAE Journal,* v. 62, June 1954, p. 50-51.

Tips on worker's deafness, surface flaws, hammer dampers, induction heating and lubricants. (F22)

232-F. (French.) **Hot Torsion Testing in Relation to Manufacture of Seamless Tubes.** J. Dauvergne, M. Pélabon and J. Ivernel. *Revue de métallurgie,* v. 51, no. 4, Apr. 1954, p. 254-263; disc., p. 263-264.

Gamma-delta transformations of alloy steels causing serious defects in tubemaking. Tables, graphs, micrographs, photograph. 4 ref. (F26, N8, AY)

233-F. (Hungarian.) **The Manufacture of Aluminum - Copper - Magnesium Plate. II.** E. Istvan Boczor. *Kohaszati Lapok,* v. 9, no. 2, Feb. 1954, p. 85-91.

Details of manufacturing process. Graphs, diagrams, tables. 9 ref. (F23, Al, Cu, Mg)

234-F. (Book.) **The Closed Die Forging Process.** P. E. Kyle. 142 p. MacMillan Co., 60 Fifth Ave., New York 11, N. Y. $1.50.

Essential steps in production. Uses for products. (F22)

235-F. (Book.) **The Extrusion of Metals.** Claude E. Pearson. Revised reprint. 206 p. 1953. Chapman and Hall, Ltd., 37 Essex St., London W. C. 2, England. 30s.

Standard reference book. Ugine-Sejournet process is mentioned. (F24)

236-F. (Book—Russian.) **New Researches in the Field of Forging Technology.** E. P. Unksov, editor. 195 p. 1950. Government Scientific-Technical Publishing House, Moscow.

Collection of seven articles. Experiments in forging, cold and hot upsetting of steels, cold forming and condition of steel as factor in forming. (F22, ST)

G
Secondary Mechanical Working

290-G. Chip-Breaking. Oscar Schnellmann. *Aircraft Production,* v. 16, May 1954, p. 168-172.

Applying a continuously variable tool feed to existing equipment for producing short-length swarf. Tables, diagrams, photographs. (G17)

291-G. Cope Talks on Draw Dies. XII. Tapered Shells Require Skillful Operation Layout. Stanley R. Cope. *American Machinist,* v. 98, May 10, 1954, p. 168-171.

Rules and applications for drawing tapered shells. Layout of preliminary shells. Diagrams. (G4)

292-G. Drop Hammer, Trapped Rubber Dies Form Aircraft Parts Faster. T. M. Rohan. *Iron Age,* v. 173, May 6, 1954, p. 121-123.

Materials, equipment, techniques and applications. Table, photographs. (G8, Al, SS)

293-G. Titanium Machinability for Management. I. *Iron Age,* v. 173, May 6, 1954, p. 128-131.

Feeds, speeds, tool life, power requirements and other important data. Graphs, table, diagrams. (G17, Ti)

294-G. Effect of Shot-Peening Variables and Residual Stresses on Fatigue Life. R. L. Mattson and W. S. Coleman, Jr. *Metal Progress,* v. 65, May 1954, p. 108-112.

Abridged from paper presented before Society of Automotive Engineers, Oct. 1953, Hershey, Pa. Results of tests on leaf spring specimens. Graphs, photograph. (G23, Q7, ST)

295-G. Drawing Stainless, How to Make It Fit Your Product. *Steel,* v. 134, May 10, 1954, p. 134-135, 137.

Careful attention to properties can make stainless a significant factor in product design. Profitable production of shapes. Photographs, graph, table. (G4, SS)

296-G. Use of Gas-Shielded Arc Processes for Cutting Non-Ferrous Metals. W. G. Hull. *Welding and Metal Fabrication,* v. 22, May 1954, p. 188-191.

Argon and self-adjusting arc processes used for cutting materials not amenable to oxygen cutting. Photographs, tables. 2 ref. (G22, EG-a)

297-G. Advanced Automatic Flame Cutting for Machinery Weldments. Howard B. Cary. *Welding Journal,* v. 32, Oct. 1953, p. 957-965.

Chain flame cutting in fabrication of weldments for power shovels. Photographs. 3 ref. (G22)

298-G. Recent Developments in Powder Processes. R. S. Babcock. *Welding Journal,* v. 32, Oct. 1953, p. 986-991.

Extends use to scarfing blooms and billets; powder washing steel castings; and cutting nonferrous metals and fire-brick. Photographs. (G22)

299-G. (German.) **Jigs and Fixtures for Oxy-Acetylene Cutting.** Hans von Hofe. *Schweissen und Schneiden,* v. 6, no. 4, Apr. 1954, p. 145-154.

Cutting of parts with plane and curved surfaces. Photographs, diagrams. 8 ref. (G22)

300-G. (Russian.) **Investigation of Wear of a Cutting Tool by Means of Radioactive Isotopes.** E. P. Nadeinskaia. *Izvestia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 1, Jan. 1, p. 24-40.

Influence of machining time, cutting speed, depth of cut, feed rate and cooling agent on the wear of hard-alloy tool. Photographs, graphs. (G17, Q9, TS)

301-G. (Russian.) **Milling of Cast Iron Objects With Mineral Ceramic Tools.** D. K. Margulis. *Stanki i Instrument,* v. 25, no. 2, Feb. 1954, p. 7-15.

Influence of various factors on wear and strength of cutters. Diagrams, graphs, photograph. (G17, CI)

302-G. How to Bend Aluminum Tube and Bar. J. M. Adle. *American Machinist,* v. 98, May 24, 1954, p. 137-144.

Compares methods for cold bending, analyzes tooling and lubrication. Photograph, diagrams. (G6, Al)

303-G. Machining Titanium With Coolants. *American Machinist,* v. 98, May 24, 1954, p. 155, 157, 159.

Effects on tool life by various liquid and gaseous coolants. Graphs, table. (G17, G21, Ti)

304-G. Recent Developments in the Theory and Design of Electric Spark Machine Tools. E. M. Williams, J. B. Woodford, Jr., and Richard E. Smith. *Applications and Industry,* 1954, no. 12, p. 83-86; disc., p. 87-88.

Results of research into fundamental processes, design trends in electric circuits of spark machine tools. Oscillograms, micrographs, graphs, tables. 8 ref. (G17)

305-G. On the Theory of Regenerative Chatter in Precision-Grinding Operations. R. S. Hahn. *ASME, Transactions,* v. 76, May 1954, p. 593-597; disc., p. 597.

Analysis based on proportionality of instantaneous wheel depth of cut to instantaneous dynamic force existing between wheel and work. Diagrams, graphs. 8 ref. (G18)

306-G. An Experimental Study of Metal Extrusions at Various Strain Rates. J. Frisch and E. G. Thomsen. *ASME, Transactions,* v. 76, May 1954, p. 599-606; disc., p. 606.

Particle velocities, magnitude and direction for inverted extrusion process using a sharp-edged die, determined on a meridian plane by stepwise method. Wall and mean pressures obtained. Photograph, graphs, diagrams, tables. 7 ref. (G5)

307-G. Some Observations on an Overseas Tour of Production Engineering Research Centres. C. A. Gladman. *Australasian Engineer,* 1954, Mar. 8, p. 47-55.

Organization and work of typical research organizations in Europe, Britain and U.S.A. Influence of metallurgy on machinability, vibration dampers for boring quills, rotary cutting tool, spark machining and electrolytically assisted grinding. Graphs, diagrams. (G17, G18, A9)

308-G. The Grinding of Steel. XVIII. Lapping. *Edgar Allen News,* v. 33, May 1954, p. 111-112.

Abrasives need not be coarse. Range available goes from 60 to 1000 grit; 150 is usually used. (To be continued.) (G19)

309-G. Abrasive Finishing. Gilbert C. Close and R. Stanley Burt. *Finish,* v. 11, June 1954, p. 24-27.

Compounds, equipment and techniques employed for lapping metal surfaces. Diagrams, photographs. (G19)

310-G. Traveling Pressure Shoe Extends Stretch Forming Uses. Henry Hein. *Iron Age,* v. 173, May 20, 1954, p. 141-143.

Machine makes accurate arcs and circles from tough alloys. Photographs. (G9)

311-G. Titanium: Airforce Machinability Report. II. *Iron Age,* v. 173, May 20, 1954, p. 144-147.

Routing, drilling, tapping and sawing methods. Photographs. (G17, Ti)

312-G. Deep-Drawing Properties of Sheet Steel. Fundamental Principles and Test Methods. Olov Svahn. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 129-142.

Survey of research project started in 1945. Two standard tests proposed. Diagrams, tables, photographs, graphs. 47 ref. (G4, CN)

313-G. Cold Heading. Frank C. Boyd. *Machine Design,* v. 26, May 1954, p. 187-190.

Recent developments in this familiar production technique have opened new opportunities for cost saving in design. Photographs, diagrams. (G10)

314-G. Factors Influencing the Tapping of Titanium. *Metal-Working,* v. 10, June 1954, p. 14-15.

Hole specifications, cutting fluids and tap selection. Tables, photographs, diagram. (G17, G21, Ti)

315-G. Impact Extruding Magnesium. C. Ridgely Kemp. *Modern Metals,* v. 10, May 1954, p. 44, 46.

Advantages and limitations. Photographs. (G5, Mg)

316-G. Assembly Machines Contribute to: Reduced Production Costs. Improved Quality. C. A. Nichols and W. A. Fletcher. *SAE Journal,* v. 62, May 1954, p. 34-37.

Abridged from "Designing and Building High-Speed Production Assembly Machines," presented at SAE National Production Meeting, Chicago, Mar. 1954. In-line machines for automatic machining of major components can cut costs and improve quality. Photographs, diagram. (G17)

317-G. Statistical Controls Lengthen Life of Cutting Tools. W. H. Seacord and F. L. Helmel. *SAE Journal,* v. 62, May 1954, p. 55-57.

Abridged from "Statistical Control Methods as Applied to Cutting Tools" presented at SAE Annual Meeting, Detroit, Jan. 1954. Statistical control of gear hobs, milling cutters, broaches, form tools and other cutting tools lower costs. Photograph, graph, chart. (G17, S12)

318-G. Forming Proves Able Grappler in Aircraft Arena. R. E. Furgeson. *SAE Journal,* v. 62, May 1954, p. 78-83.

Abridged from secretary's report of Panel on Forming SAE Aircraft Production Forum, Los Angeles, Sept. 1953. Rubber, stretch and draw forming. Photographs, diagrams. (G8, G9, G4, Ti)

319-G. How to Grind Titanium. C. I. Bradford. *Steel,* v. 134, May 17, 1954, p. 118-119.

Selection of proper wheels, use of effective coolants and correct wheel feeds. Photographs. (G18, G21, Ti)

320-G. Life in a Roll Grinding Shop. Thomas A. Kindre. *Steelways,* v. 10, June 1954, p. 17-19.

How experts repair and maintain rolls in steel mill. Photographs. (G18, ST)

321-G. Preventing Press Failures. Maintenance and Operation. A. F. Gagne, Jr. *Tool Engineer,* v. 32, June 1954, p. 54-58.

Preventive maintenance with detection and load control devices can usually prevent power-press smashups. Diagram, photographs. (G1)

322-G. Bending Aluminum Tubing. J. E. Hawking. *Tool Engineer,* v. 32, June 1954, p. 59-60.

Tests made on tubing ranging in diameter from ½ to 1¾ in., and in various alloys, wall thicknesses, and tempers to determine which sizes and alloys could be successfully bent to centerline radii of 1 or 2 diameters. Table, photographs. (G6, Al)

323-G. High-Speed Hobbing. J. W. Rapp. *Tool Engineer,* v. 32, June 1954, p. 77-80.

Abstracted from paper 22T32-1, "Hobbing Gears at High Speed", presented at 22nd ASTE Annual Meeting. Gear hobbing production can be increased by 100 to 150% without additional equipment, manpower, tool cost or tool maintenance. Research data offered in support. Photographs, graphs. (G17)

324-G. Machining Titanium. G. T. Fraser. *Tool Engineer,* v. 32, June, 1954, p. 81-83.

Abstracted from paper 22T36, "What is Known Today About Machining Titanium", presented at the 22nd ASTE Annual Meeting. Developments in all forms of machining. Table. (G17, Ti)

325-G. Shielded-Metal-Arc Cutting and Grooving. Helmut Thielsch and Joseph Quaas. *Welding Journal,* v. 33, May 1954, p. 438-446.

Principles of method. Characteristics and development of special coatings; cutting and grooving of mild steel, stainless steel, cast iron and copper; effects of electrode diameter, current, cutting speed. Photographs, diagrams, graphs, tables. 1 ref. (G22, ST, SS, CI, Cu)

326-G. More About Aluminium Lubrication. George Nicol. *Wire Industry,* v. 21, May 1954, p. 503-508.

Drawing problems and varieties of lubricants. (G21, G4, Al)

327-G. (German.) Investigation on the Machinability of Steels as Dependent on Heat-Treatment. Mechanical Properties and Structure of Steels Tested. Hans-Joachim Wiester. **Effect of Heat Treatment of Steels on the Main Cutting Power in Turning.** Otto Kienzle and Hans Victor. **Effect of Heat Treatment of Steels on Machinability in Turning and Boring With High Speed Steel Tools.** Walther Leyensetter and Erhard Kaluza. *Stahl und Eisen,* v. 74, no. 9, Apr. 22, 1954, p. 526-551.

Tensile strength and examination of structure after various heat treatments. Tables, micrographs, graphs, diagrams, photographs. 53 ref. (G17, J general, ST)

328-G. (German.) Lüder's Lines on Metal Surfaces—Their Formation and Prevention. R. Ergang. *Umschau in Wissenschaft und Technik,* v. 54, no. 8, Apr. 15, 1954, p. 243-244.

Lines are visible in drawn steel or may cause cracking in enameled products. Annealing at 600 to 650° C. or predrawing beyond the 2 to 4% elongation will correct this phenomenon. Photographs, graphs. 5 ref. (G4, J23, ST)

329-G. (Russian.) Machining of High-Strength Cast Iron. N. N. Zorev and A. Ia. Artamonov. *Stanki i Instrument,* v. 25, no. 3, Mar. 1954.

Application of coolants; effect on machine tool. Table, graphs. (G17, G21, CI)

330-G. Cope Talks on Draw Dies. XIII. Iron Shells to Get Accurate Diameters or Smooth Finish. Stanley R. Cope. *American Machinist,* v. 98, June 7, 1954, p. 134-137.

To obtain ironing effect, clearances and diameter reduction are less. Diagrams. (G4)

331-G. Thermal Number Measures Efficiency of Metal Cutting. Kenneth J. Trigger. *American Machinist,* v. 98, June 7, 1954, p. 145-152.

Distribution of heat among workpiece, chip and tool is of prime importance in determining efficiency of operation. Graphs, diagrams. (G17)

332-G. Belt Grinding of Titanium. I-III. *American Machinist,* v. 98, June 7, 1954, p. 163, 165, 167.

Reference sheets for three alloys. Two types of wet belts were used, in three grits, at speeds from 1000 to 10,000 ft. per min., at various feeding pressures, and with various coolants. (G18, Ti)

333-G. Full Automation for Piston Pins. Joseph Geschelin. *Automotive Industries,* v. 110, June 1, 1954, p. 48-50.

Batteries of automatic equipment used to machine manifolds at Ford engine plant. Photographs. (G17)

334-G. Electric Eye Guides Continuous Flame-Cutting Action. H. B. Cary. *Iron Age,* v. 173, June 3, 1954, p. 120-123.

Equipment can cut all parts of one plate thickness for a weldment in one continuous operation. Eliminates most layout work. Photographs. (G22)

335-G. Transfer Machining of Armored Vehicle Hulls. T. L. Hallenbeck. *Machinery,* v. 60, June 1954, p. 163-167.

Accurate boring, facing, drilling and tapping of hulls are being performed on a 100-ft. long transfer machine. Photographs. (G17)

336-G. The Production of Headed Pins. *Machinery (London),* v. 84, May 14, 1954, p. 1021-1024.

Formed wire parts manufacture. Photographs, diagrams. (G11, Ni, Cu)

337-G. Developments in the CeDe-Cut Technique. *Machinery (London),* v. 84, May 14, 1954, p. 1033-1040.

Possibilities of liquid carbon dioxide as a cooling medium; satisfactory operating techniques. Photographs, diagrams. (G21)

338-G. Milling Machine Leads. S. W. Hugo. *Mechanical World and Engineering Record,* v. 134, May 1954, p. 198-201.

Method enables change gears for universal milling machine to be calculated quickly and accurately. (G17)

339-G. How to Cut Worms on a Hobbing Machine. Peter R. Noling. *Modern Machine Shop,* v. 27, June 1954, p. 116-122.

Procedure for cutting by hobbing and milling process, depending on number of threads on worm. Photographs, drawings. (G17)

340-G. Piercing Punch Calculation. Federico Strasser. *Modern Machine Shop,* v. 27, June 1954, p. 178-180, 182, 184.

Methods determine correctness of physical properties and dimensions of a punch for job at hand. Diagrams, table. (G2)

341-G. P&WA Is Shot Peening Over 400 Parts. H. J. Noble. *SAE Journal,* v. 62, June 1954, p. 44-46.

Improves fatigue resistance of aircraft parts by bonding together surface layers where fatigue failures often start. Photographs. (G23, Al)

342-G. Titanium Machining Problems Overcome With Proper Techniques. Fred Spiegl. *Western Metals,* v. 12, May 1954, p. 45-48.

Solutions considered as starting points for adaptations to particular requirements and available equipment. Photographs, tables, diagrams. (G17, Ti)

343-G. (Book.) Metal Cutting Tool Handbook. 3rd Ed. 689 p. Metal Cutting Tool Institute, 405 Lexington Ave., New York 17. $6.50.

Covers drills, reamers, counterbores, taps and dies, milling cutters, gear hobs, gear-shaper and gear-shaving cutters, broaching tools, and general engineering data. Nomenclature, types, sizes, suggested speeds and feeds, troubleshooting, and associated tabular data. (G17)

344-G. (Book.) A Treatise on Milling and Milling Machines. 3rd Ed. 910 p. 1951. The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. $8.00.

Functions and operations of milling machines and milling attachments; cutting tools and technical data on metal cutting; practical applications of toolroom milling and die sinking; principles of fixture design; modern production methods; and selection of milling equipment. (G17)

345-G. (Book.) U.S.A.F. Machinability Report, Vol. III. Titanium. James Van Voast. 153 p. Curtiss-Wright Corp., Wood-Ridge, N. J. $4.60.

Includes turning, milling, routing, drilling, tapping, abrasive cutting, hacksawing, belt grinding, and surface grinding. (G17, Ti)

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Powder Metallurgy

85-H. A New Carbide-Base Cermet Containing TiC, TiB_2, and CoSi. Harold M. Greenhouse, Robert F. Stoops and Thomas S. Shevlin. *American Ceramic Society, Journal,* v. 37, May 1954, p. 203-206.

Development and properties. Has excellent load-carrying properties at 1800° F. Tables, graphs, micrographs. 5 ref.

(H general, P general, Q general)

86-H. Method Described for Evaluation of Lubricants in Powder Metallurgy. I. Sheinhartz, H. M. McCullough and J. L. Zambrow. *Journal of Metals,* v. 6, May 1954, p. 515-518.

Experimental procedure leads to series of mathematical relationships to predict results. Diagram, graphs, tables. 7 ref. (H13)

87-H. The Warm Pressing of Beryllium Powder. Norman P. Pinto. *Journal of Metals,* v. 6, May, 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 629-633.

Compacting below recrystallization temperature studied. Ideal density attained at 550 to 600° C. using 25 tons per sq. in. Graphs, diagrams, tables, micrographs. 12 ref.
(H14, Be)

88-H. What About the Army's Powdered Iron Rotating Bands? *Precision Metal Molding,* v. 12, May 1954, p. 48, 70-71.

Answers pertinent questions in regard to specifications, supply, working ability and testing.
(H general, Fe)

89-H. Powdered Iron Cores of Today. John C. Webb. *Precision Metal Molding,* v. 12, May 1954, p. 52, 88-90.

Uses of hydrogen-reduced iron powder, magnetite, electrolytic iron powder, carbonyl iron powder and synthetic iron oxides.
(H general, Fe)

90-H. A New, Prealloyed, Stainless Steel Powder. A. Adler. *Precision Metal Molding,* v. 12, May 1954, p. 54-56, 80-81.

Properties similar to sheet and bar stock. Ferritic chromium stainless types and certain high-nickel alloys produced by this method. Tables.
(H11, SS)

91-H. (Russian.) **Temperature Effect on the Cathode During Electrodeposition of Powdered Cadmium.** D. N. Gritsan and A. M. Bulgakova. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 2, Feb. 1954, p. 258-264.

Various effects with increased current density and decreased concentration of the electrolyte. Table, graphs. 11 ref. (H10, Cd)

92-H. (Russian.) **Influence of Anions on the Temperature Effect on the Cathode During Electrodeposition of Powdered Metals.** D. N. Gritsan, A. M. Bulgakova, and G. A. Zolotareva. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 2, Feb. 1954, p. 337-344.

Increased magnitude of temperature effect on cadmium, zinc and copper salts with increased current density. Tables, graphs. 9 ref.
(H10, Cd, Zn, Cu)

93-H. Alloy Steels and Powder Metallurgy. H. W. Greenwood. *Engineer,* v. 197, May 7, 1954, p. 676-677.

Production of alloy steels by powder metallurgy offers many advantages. Use of oxides and other compounds improves physical properties, with enhanced resistance at high temperatures to corrosion, oxidation and other causes of metallic deterioration. 5 ref. (H general, AY)

94-H. Production and Properties of High-Purity Nickel B7 Powder. F. A. Forward. *Institute of Metals, Journal,* v. 82, 1954; *Institute of Metals, Bulletin,* v. 2, May 1954, p. 113-116.

New process developed to produce powder from Canadian ore. Consists of a combined ammonia-leaching and hydrogen-reduction operation. Table, graph, micrographs.
(H10, H11, Ni)

95-H. (German.) **Hot Pressing Molded Parts of Copper Powder.** R. Palme. *Metall,* v. 8, nos. 9-10, May 1954, p. 369-371.

Oxidation prevented by use of methylene. Increased hardness properties. Diagram, graphs, table, micrograph. 8 ref. (H14, Cu)

96-H. (German.) **Recent Developments in Field of Powder Mettallurgy.** F. Benesovsky. *Metall,* v. 8, no's. 9-10, May 1954, p. 378-385.

Literature review. Photographs. 145 ref.
(H general, Ni, Ag, W, Al, Fe, Cu)

97-H. (Russian.) **Investigation of Oxidation Processes of Iron Powder at High Temperatures.** P. D. Dankov and N. K. Andrushchenko. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 3, Mar. 1954, p. 519-524 + 2 plates.

Oxidation velocity at temperatures of 200, 400, 600, 800 and 1000° C. 3 ref. (H11, Fe)

98-H. Sheet Metals Can Be Made From Metal Powder. W. D. Jones. *American Machinist,* v. 98, June 7, 1954, p. 142-144.

Continuous manufacture of sheet, rods, tubes and extruded sections from powders extracted directly from ores eliminates steps in fabricating processes. Photographs.
(H10)

99-H. Bonding in Cermets. L. S. Williams and P. Murray. *Metallurgia,* v. 49, no. 295, May 1954, p. 210-217.

Surface and bulk interaction and interfacial tension conditions. Tables, graphs. 27 ref.
(H14, Cu, Au, Ag)

100-H. (French.) **The Properties of Semifinished Products Made From Compacts of Oxidized Aluminum.** J. Hérenguel and J. Boghen. *Revue de métallurgie,* v. 51, no. 4, Apr. 1954, p. 265-277; disc., p. 277.

Factors affecting properties of sintered products. Tables, graphs, micrographs. 8 ref. (H11, Al)

101-H. (German.) **Activation Energy of the Sintering Process.** Gerhard Bockstiegel, Georg Masing and Gerhard Zapf. *Applied Scientific Research,* v. 4, sec. A, no. 4, 1954, p. 284-294.

Density increase during sintering of iron powder bodies below 908° C. Relation of activation energies for sintering and self diffusion. Tables, graphs. 6 ref. (H15, P12, Fe)

102-H. (Book.) **Production of Cermets by Flash Sintering Process.** Wright Air Development Center. Report No. PB 111286. 69 p. 1952. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $2.00.

Production of turbojet engine blades and other temperature-resistant components. Historical background of process, description of flash-sintering equipment, and discussion of test results. (H15)

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J

Heat Treatment

180-J. Just Spin Them in Salt. Charles G. Lee. *American Machinist,* v. 98, May 10, 1954, p. 132-133.

Selective hardening in salt bath needs only a simple motorized fixture, is fast and minimizes gear distortion. Photographs. (J2)

181-J. Short-Cycle Normalizing Coordinates Tube Mill Production. J. Kniveton. *Iron Age,* v. 173, May 6, 1954, p. 136-138.

Equipment, plant layout, operating procedures, advantages. Table, diagram, micrographs, graph, photograph. (J24, ST)

182-J. Investigation of the Heat Treatment of Commercial Titanium-Base Alloys. L. Luini and E. Lee. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 581-592.

Reports wide range of possible hardness and microstructural characteristics. Brittleness and notch sensitivity appear to be characteristic of age hardening to high hardness. Ductility, tensile strength and elongation. Tables, graphs, micrographs. 5 ref. (J general, Q23, Ti)

183-J. Steam Tempering Furnace. *Machinery Lloyd (Overseas Ed.),* v. 26, Apr. 24, 1954, p. 121-122.

Advantages of steam and design considerations for installations. Diagram. (J29)

184-J. Notes on the Relative Merits of Pack and Gas Carburizing. T. S. Lister. *Machinery (London),* v. 84, Apr. 30, 1954, p. 902-904.

Importance of supervision, economics and control. (J28)

185-J. Line of Salt Baths Heat Treats 90-Mm. Gun Recoil Mechanism. Glenn F. Hyde. *Metal Progress,* v. 65, May 1954, p. 104-108.

Compares results to oil quenching. Photographs, diagram, tables. (J2, AY, CI)

186-J. Quench Cracks in Wrought Steel Tubes. Cyril Wells. *Metal Progress,* v. 65, May 1954, p. 113-121.

Nature of cracking statistics, susceptibility, causes and remedies. Graphs, photographs, tables.
(J26, Q26, ST)

187-J. (Dutch.) **Inductive Heating With Low Frequencies.** *Bedrijf en Techniek,* v. 9, no. 198; *Electronica Section,* v. 7, no. 145, Mar. 27, 1954, p. 49-51.

Operation of low-frequency heating, effect on work piece and advantages of process. Diagrams, photograph. (J2, Fe, Cu, Al, Zn)

188-J. (French.) **Heat Treatments of Spheroidal Cast Irons.** Marcel Ballay, Raymond Chavy and Jacques Grilliat. *Fonderie,* Mar. 1954, no. 98, p. 3849-3862; disc., p. 3863.

Six different heat treatments, resulting mechanical properties and structures. (See item 8435, v. 3, June 1954.) Tables, graphs, photograph, diagram. 12 ref.
(J general, Q general, M27, CI)

189-J. (Hungarian.) **Heat Treatment of Magnesium Alloys.** Gyula Emod. *Kohaszati Lapok,* v. 9, no. 2, Feb. 1954, p. 76-85.

Stress relief, homogenization of structure, hardening, control of heat treatment and equipment. Diagrams, graphs, tables, micrographs. 9 ref.
(J general, Mg)

190-J. (Hungarian.) **The Applicability of the Electrically Heated Salt Bath**

Tank Furnace Used for the Heat Treatment of Aluminum, and Methods for Avoiding the Danger of Explosions. Janos Solymosi. *Kohaszati Lapok,* v. 9, no. 2, Feb. 1954, p. 92-94.

Advantages of uniform temperature in all parts of the furnace. Possibility of treating pieces of varying compositions simultaneously. Diagrams. (J2, Al)

191-J. Heat-Treatments of Welded Structures for Relief of Residual Stresses With Particular Reference to Type 347 Stainless-Steel Weldments. W. L. Fleischmann. *ASME, Transactions,* v. 76, May 1954, p. 645-648.

Treatment at 1100° F. produced untwisting and established a pattern of residual stresses that did not cause any further movement when wire was cycled from room temperature to 850° F. Graphs, tables, diagrams. 11 ref. (J1, SS)

192-J. Heat Treating 50 Tons of Varied Alloys Per Week on Flexible Schedule. K. G. Hookanson. *Industrial Gas,* v. 32, May 1954, p. 6-7, 19-21.

Versatile batch furnaces meet all inventory requirements and "special" runs in 7000 types and sizes of fastenings, with a minimum initial investment. Photographs. (J general)

193-J. Continuous Heat Treat Set-up Carburizes Precision Parts. C. A. Payntor. *Iron Age,* v. 173, May 20, 1954, p. 148-150.

Automatic, pusher-type, controlled-atmosphere gas furnaces simultaneously carburize aircraft gears to varying depths. Photographs. (J28, ST)

194-J. Flame Hardening of Heavy Forgings. Stephen Smith. *Metal Progress,* v. 65, May 1954, p. 100-103.

Specially designed flame hardening machine for large and heavy objects such as steel mill and paper rolls, hydraulic rams and forming press columns. Micrographs, graph, photographs. (J2, ST)

195-J. Annealed Gray Iron Castings. Charles O. Burgess. *Product Engineering,* v. 25, May 1954, p. 142-145.

Annealing improves machinability and mechanical properties. Photograph, tables, graphs. 7 ref. (J23, G17, Q general, CI)

196-J. Fundamentals of Heat Treatment. I. Carbon Is Key to Hardness, Strength. II. Alloying Agents Add Tailored Properties. Norbert K. Koebel. *Steel,* v. 134, May 17, 1954, p. 102-104; May 24, 1954, p. 98-99.

Effects on physical properties when composition is varied. Photographs, graphs, diagram. (J general, Q general, ST)

197-J. A Survey of Quenching Oils. James McElgin. *Steel Processing,* v. 40, May 1954, p. 315-318.

Characteristics necessary in straight and compounded mineral oils and new high-speed oils. Photographs, diagrams, graphs. (J2)

198-J. (Russian.) **Heat Treating of Cast Magnesium Alloy ML-5 in Protective Atmospheres.** I. A. Makolkin and S. N. Shestakov. *Zhurnal Prikladnoi Khimii,* v. 27, no. 4, Apr. 1954, p. 421-424.

Effect of carbon dioxide on mechanical properties. Tables. 8 ref. (J2, Q general, Mg)

199-J. Low Temperature Treatment. I. Antoni Niedzwiedski. *Canadian Metals,* v. 17, May 1954, p. 49-51.

Increase in hardness and freedom from residual internal stress accomplished by holding steel at −120° F, 4 to 6 hr. 16 ref. (J26)

200-J. Hardening by Induction. D. Warburton-Brown. *Mechanical World and Engineering Record,* v. 134, May 1954, p. 212-215, 229-231.

Operation of heating process as applied to steel. Diagrams, graph, tables. 1 ref. (J2, ST)

201-J. A Survey of Applications of British Industrial High Frequency Induction Heating Equipment and Their Economic Aspect. *Metallurgia,* v. 49, no. 295, May 1954, p. 223-229.

Method suited to localized metallurgical heating. Tables graph, photographs, diagram. (J2, A4)

202-J. Deboronization of Steels. J. C. Shyne and E. R. Morgan. *Metal Progress,* v. 65, June 1954, p. 88-90.

Proposes modified standard end-quench test procedure be adopted for boron steels to eliminate possible errors. Graphs, micrograph. 2 ref. (J28, ST)

203-J. Carbon Restoration of Bar Stock With a Batch-Type Furnace. H. W. Callahan. *Metal Progress,* v. 65, June 1954, p. 95-99.

Bars from cold finishing mills that require heat treatment are processed in a special radiant tube, car-bottom-type furnace for carbon restoration atmospheres. Diagrams, micrographs, photographs, table. 3 ref. (J28, CN, AY)

204-J. Selection and Heat Treatment of Tool and Die Steels. II. Howard E. Boyer. *Modern Machine Shop,* v. 27, June 1954, p. 124-131.

Data for tool and process engineers and tool and die makers. Table, graphs. (To be continued.) (J general, TS)

205-J. How to Heat Treat Titanium. C. I. Bradford. *Steel,* v. 134, May 31, 1954, p. 92-93.

Details of nitriding, carburizing, carbonitriding, stress-relieving and annealing. Micrographs. (J28, J1, J23, Ti)

206-J. (Book—Russian.) **Heat Treatment of Rails.** I. P. Bardin, editor. 260 p. 1950. Akedemii Nauk, U.S.S.R., Moscow.

Collection of 15 papers on advances in theory and practice and quality of rail steels. Textbook. (J general, T23, ST)

207-J. (Book—Russian.) **Selected Writings on the Heat Treatment of Steel.** Sergei Samoilovich Shteinberg. 256 p. 1950. Government Scientific-Technical Publishing House, Moscow.

Articles of significance in metallurgy of heat treatment. (J general, ST)

K Joining

380-K. Silver Brazing Goes Semi-Automatic. C. P. Spiesz and F. G. Leuthner. *American Machinist,* v. 98, May 10, 1954, p. 121-124.

Setup brazes air-fan rotors and stators automatically once work is clamped. Photographs, graph. (K8, Ag)

381-K. Weld Seam and Weld Flux Effect on Metal Surface and Coating Life. A. J. Liebman. *Corrosion,* v. 10, May 1954, p. 147-150.

Alkaline and hygroscopic welding flux by-products, deposited on weld seam and adjacent areas, frequently cause early failure of coatings on welds. Photographs. 1 ref. (K1)

382-K. Plastic Welding Fixtures Cost Little, Assure Accuracy. A. P. Challenger. *Iron Age,* v. 173, May 6, 1954, p. 124-125.

Fixtures made of cast phenolic resin offer a substantial cost advantage over metal fixtures. Photographs. (K general)

383-K. Welding Tubes to Tube Sheets. H. A. Huff, Jr., and A. N. Kugler. *Mechanical Engineering,* v. 76, May 1954, p. 421-425, 433.

Brazing process used on tubes of unfired heat transfer equipment. Diagrams, chart, photograph. 9 ref. (K8)

384-K. Design of a Metal-to-Plastic Joint That Resists Stress. W. E. Cummings. *Precision Metal Molding,* v. 12, May 1954, p. 38-39, 92-93.

Solution to problem of inserting a molded plastic piece between two metal end connectors so assembly will resist torque, internal pressure and tensile stress. Photographs. (K11)

385-K. Fastening Sheet-Metal Parts by Tongues, Snaps or Clinching. *Product Engineering,* v. 25, May 1954, p. 174-175.

Detachable and permanent assembly of parts. Diagrams. (K13)

386-K. Heavy Armoured Vehicle Fabrication. J. W. Brind. *Welding and Metal Fabrication,* v. 22, May 1954, p. 166-173.

Welding of tank armor plate and castings. Photographs, diagrams. (K general)

387-K. Atomic Hydrogen Welding in the Chain-Making Industry. A. T. P. Black. *Welding and Metal Fabrication,* v. 22, May 1954, p. 174-177.

Care to insure correct choice of filler wire, good welding technique and complete protection of weld metal in its fluid state from contamination—particularly from atmosphere. Micrographs, photographs. 2 ref. (K1, ST)

388-K. Automatic Welding and Rapid Erection of Spherical Pressure Vessels in Russia. A. S. Fal'kevich and M. B. Gann. *Welding and Metal Fabrication,* v. 22, May 1954, p. 178-181. (Translated from *Avtogennoe Delo, Moscow,* v. 23, no. 3, 1952.)

Previously abstracted from original. See item 492-K, 1952. (K1, ST)

389-K. Protection From Radiation of Personnel Engaged in Inert-Gas Metal-Arc Welding. *Welding and Metal Fabrication,* v. 22, May 1954, p. 183.

General precautions with special reference to welding of aluminum alloys. (K1, Al)

390-K. New Way to Repair Ductile Iron. *Welding Engineer,* v. 39, May 1954, p. 49.

Technique of filling up blowholes and shrinkage cavities in ductile iron castings with sound metal. Micrographs. (K general, CI)

391-K. Practical Design for Welding. II. Rex Cleveland. *Welding Engineer,* v. 39, May 1954, p. 58-60.

Elimination of guesswork from design computations by use of formulas. Diagrams. (K9)

392-K. Powdered Iron in the Coating? The Case For. L. K. Stringham. *Welding Engineer,* v. 39, May 1954, p. 65, 68.

Advantages of greater speed, lower cleaning costs and smoother welds. Photographs, table. (K1, ST)

393-K. Development of Welded Bridge Construction. Nathan W. Morgan. *Welding Journal,* v. 32, Oct. 1953, p. 923-927.

Reviews research, specifications and resulting practice. Photographs, diagrams. (K general, T26)

394-K. Continuous Welded Structures. W. S. Atkins and E. M. Lewis. *Welding Journal,* v. 32, Oct. 1953, p. 928-946.

Surveys welded structures in Great Britain and Europe. Diagrams, photographs. (K general, T26)

395-K. Joining of Ductile Iron by Several Arc Welding Methods. T. E. Kihlgren and H. C. Waugh. *Welding Journal,* v. 32, Oct. 1953, p. 947-956.

Metal and inert-arc welding of magnesium-containing cast iron, using nickel-iron or steel electrodes

and nickel-iron filler wire. Tables, photographs. (K1, CI)

396-K. Fusion Welding of Light-Gage Alloys. J. T. Maloney. *Welding Journal,* v. 32, Oct. 1953, p. 966-969.

Suitable jigs and proper welding processes assure successful welding of aircraft assemblies. Photographs. (K1, K2, Al)

397-K. Some Considerations on Weldability of Aluminum Alloys. J. Koziarski. *Welding Journal,* v. 32, Oct. 1953, p. 970-986.

Reviews international literature. Diagrams, graphs, micrographs, tables, photographs. 57 ref. (K9, Al)

398-K. Quarry Maintenance. J. Dean Davidson. *Welding Journal,* v. 32, Oct. 1953, p. 992-996.

Heavy heating with oxy-acetylene flame, oxy-acetylene welding and oxygen cutting processes. Photographs. (K2, G22)

399-K. The Effect of Alloying Elements on Welds in Titanium. G. E. Faulkner, G. B. Grable and C. B. Voldrich. *Welding Journal,* v. 32, Oct. 1953, p. 481S-497S.

Effects of iron, manganese, chromium and molybdenum on mechanical and metallurgical properties of welded joints in titanium. Tables, diagrams, photographs, graphs, micrographs. 2 ref.
(K general, Q general, Ti)

400-K. Investigation of Structural Failures of Welded Ships. I. Examination of Samples and Analyses of the Failures. Morgan L. Williams and George A. Ellinger. *Welding Journal,* v. 32, Oct. 1953, p. 498S-527S.

Samples of fractured plates from 100 ships examined. Tests on 130 selected plates analyzed. Photographs, tables, micrographs, graphs. 25 ref. (K9, CN)

401-K. (German.) **Electric Resistance Welding of Light Alloys.** G. Moressée. *Aluminium,* v. 30, no. 4, Apr. 1954, p. 152-157.

Classification of welds, importance of parameters. Graphs, diagrams. (K3, Al)

402-K. (German.) **Rationalization in the Production of Bicycles and Light-Weight Motorcycles by Resistance Welding.** H. Kleine-Weischede. *Schweissen und Schneiden,* v. 6, no. 4, Apr. 1954, p. 142-145.

Increased economy in industrial application. Photographs, diagrams. (K3)

403-K. (Swedish.) **Electrode OK70P.** *Svetsaren,* v. 18, no. 4, 1953, p. 49-52.

Analysis, physical properties and use of electrode. Mechanical properties, heat treatment and microstructure of welds. Tables, graph, micrographs. (K1, T5, AY)

404-K. (Swedish.) **Method of Repairing Broken Engine Blocks and Similar Work Pieces.** Arthur Nilsson. *Svetsaren,* v. 18, no. 4, 1953, p. 53-54.

Repaired by welding. Photographs. (K general, CI)

405-K. The 'Great Jib' of the W1400 Walking Dragline. A. Scott. *British Welding Journal,* v. 1, May 1954, p. 197-205.

Welded structure of world's largest walking dragline. Table, photographs, diagram. (K general, AY)

406-K. Tentative Code of International Symbols for Designating Covered Electrodes for Arc Welding of Mild and Low-Alloy High-Tensile Steels. *British Welding Journal,* v. 1, May 1954, p. 205-208.

Guide which may be adopted by all countries, describes electrodes by means of symbols. Tables, diagrams. (K1, S22, CN, AY)

407-K. Resistance Welding of Coated Steels. A Review of Information. J. E. Roberts. *British Welding Journal,* v. 1, May 1954, p. 233-237.

Review of information on cadmium, lead, tin, zinc, aluminum and copper coated steels. Tables, graphs. 17 ref. (K3, ST)

408-K. Effect of Degaussing on Electric Arc Welding Operations in Ships. *Bureau of Ships Journal,* v. 3, May 1954, p. 43.

Bureau fo Ships recommends no welding be performed aboard a ship when its degaussing circuits are energized. (K1)

409-K. Modern Welding Technique. IV. Miscellanea. Sec. 24. The Training of Welders. E. T. Gill and Eric N. Simons. *Edgar Allen News,* v. 33, May 1954, p. 109-110.

Theory of welding, practical application and uses of material. (To be continued.) (K general)

410-K. Organic Bonding Metals. A. L. Phillips. *Modern Metals,* v. 10, May 1954, p. 57-58.

New bonding compound requires simple equipment, operates in lower heat ranges, produces bond strengths to 5000 psi.; also used as a filler in defective metal parts. Photographs. (K12)

411-K. Automatic Arc and Resistance Welding as Applied to Sheet and Strip Metal. J. A. Dorrat. *Sheet Metal Industries,* v. 31, no. 325, May 1954, p. 391-403.

Application of welding processes to automation. Photographs, tables, diagrams, graph. 11 ref. (K1, K3)

412-K. The Welding of Mg Base Alloys. Lester F. Spencer. *Sheet Metal Worker,* v. 45, May 1954, p. 90-91, 98-99.

Fusion and gas welding; cleaning procedures. Photographs, table. 1 ref. (K1, K2, Mg)

413-K. Welding High-Temperature Materials. Francis H. Stevenson. *Tool Engineer,* v. 32, June 1954, p. 73-76.

Fusion and resistance welding. Gives choices for particular temperature range. Photographs, graph, table. 2 ref. (K1, K3, SS, Ti)

414-K. Recommended Clearances for Copper Brazing. *Tool Engineer,* v. 32, June 1954, p. 85-86.

Results of brazes in a hydrogen atmosphere using unalloyed copper paste and wire with brazing temperature of 2050° F. Table. (K8, Cu)

415-K. Automatic Welding of Light-Gauge Fabrications. Rowland Gardener. *Welding and Metal Fabrication,* v. 22, May 1954, p. 184-187, 193.

Plate preparation and correct jigging achieve good results. Photographs, diagrams. (K1)

416-K. Tolerance and Control on Fillet Welds. John Mikulak and Merle Dillman. *Welding Journal,* v. 33, May 1954, p. 449-458.

Welding procedure control to insure suitable joint characteristics in use of manually operated semi-automatic submerged-arc process. Photographs, graphs, diagrams. (K1)

417-K. Austenitic Manganese Steel Welding Electrodes. Howard S. Avery and Henry J. Chapin. *Welding Journal,* v. 33, May 1954, p. 459-479; disc., p. 479.

Properties and welding techniques for use of molybdenum-manganese electrodes in repair and hard facing of manganese steel parts and for miscellaneous hard-facing applications. Micrographs, graphs, tables, diagrams, photograph. 18 ref.
(K1, L24, Mo, Mn, AY)

418-K. Working Conditions Ambient to Inert-Gas-Shielded Metal-Arc Welding. Leslie Silverman and Harry Gilbert. *Welding Journal,* v. 33, May 1954, p. 218S-229S.

Gas and fume concentrations and control of operator exposure. Spectrogram, tables, photographs. 26 ref. (K1)

419-K. (French.) **Fatigue Behavior of Aviation Landing Gear. Experimental Comparison Between Joining by Rivets and Gluing.** D. Clerc and M. Bogaievsky. *Recherche Aéronautique,* 1954, no. 38, Mar.-Apr., p. 57-62.

Gluing may show greater mechanical strength. Tables, diagrams, graphs. 10 ref. (K13, K12, Q7, Al)

420-K. (French.) **Machine Riveting of Light Metals. II.** B. Adaridi. *Revue de l'Aluminium,* v. 31, no. 209, Apr. 1954, p. 167-171.

Design of hydraulic-pneumatic machine with coupled generator and receiver. Diagrams, photographs. (K13, Al)

421-K. (German.) **Welding of Gray Iron.** L. Queck. *Giesserei,* v. 41, no. 9, Apr. 29, 1954, p. 242-243.

Procedures for electric and gas welding. Diagrams, table, graph. (K1, K2, CI)

422-K. (German.) **New Processes for Welding Various Metals.** *Umschau in Wissenschaft und Technik,* v. 54, no. 9, May 1, 1954, p. 275.

Welding of metal pieces not exceeding 1 sq. cm. by means of a condensor impulse discharge. Experiments on tungsten with constantan, German silver, copper, lead, aluminum and bismuth, aluminum with copper, cermet with steel and lead with steel. Photographs.
(K6, W, Ag, Cu, Pb, Al, Bi, ST)

423-K. The Oxy-Acetylene Flame for Welding and Cutting. J. P. (Mike) Weed. *Industry & Welding,* v. 27, June 1954, p. 56-57, 59-60.

Advantages, processes and equipment. Photographs. (K2, G22)

424-K. "Slag-Gas" Shielded Arc Welding Speeds Fabrication of Mild Steel. *Industry & Welding,* v. 27, June 1954, p. 64 + 6 pages.

New, faster more efficient method than conventional arc welding with flux-covered electrodes. Photographs, diagram. (K1, CN)

425-K. How to Resistance Weld Low-Alloy High-Tensile Steels. C. F. Altenburger. *Industry & Welding,* v. 27, June 1954, p. 101-104.

Tips on spot, seam and flash welding. Tables, photographs, graph. (K3, AY)

426-K. Automatic Percussion Welding Speeds Contact Assembly. A. L. Quinlan. *Machinery,* v. 60, June 1954, p. 168-171.

Multiple welding of contact blocks to ends of small wires in forming stationary contact member of the Bell System's new wire spring relay. Photographs, diagrams, micrograph. (K3)

427-K. How to Solder Stainless Steel. *Steel,* v. 134, May 31, 1954, p. 108.

Materials, equipment and methods. Photographs. (K7, SS)

428-K. How to Weld Stainless Steel. *Steel,* v. 134, May 31, 1954, p. 109-110.

Materials, methods and equipment. Photographs, table.
(K general, SS)

429-K. 30 Tons of Aluminum Wire, 15 Tons of Copper Wire. W. F. Pentz. *Welding Engineer,* v. 39, June 1954, p. 40-44.

Tonnage of welding wire required to Mig weld 6000 tons of aluminum bus and 2,750 tons of copper bus at new Kaiser plant. Photographs, diagrams, table. (K1, Al, Cu)

430-K. NEMA Standard for Electrode Identification. *Welding Engineer,* v. 39, June 1954, p. 59.

Latest electrode color chart. Diagrams, chart. (K1, S22)

431-K. (French.) **Arc-Welding of Self-Hardening Steels.** H. Granjon. *Revue de métallurgie,* v. 51, no. 4, Apr. 1954, p. 221-231; disc., p. 231-232.

Effect of electrodes, melting characteristics and welding conditions on cracking defects. Photographs, micrographs, tables, graphs, diagrams. 2 ref. (K1, ST)

432-K. (German.) **Hard Facing by Submerged-Arc Welding.** Karl Gering. *Schweissen und Schneiden,* v. 6, no. 5, May 1954, p. 183-192.

Repair and hardfacing of sintering drums and supporting rollers of high alloy steel. Process and economy. Graphs, photographs, diagrams, table. (K1, L24, AY)

433-K. (German.) **Electric Power Supply in Spot and Seam Welding.** S. Spizig. *Schweissen und Schneiden,* v. 6, no. 5, May 1954, p. 192-196.

Disadvantages of single-phase system. Welding with reduced frequency and three-phase connections. Graphs, diagrams. 7 ref. (K3)

434-K. (Pamphlet.) **Resistance Welding of Miscellaneous and Dissimilar Metals.** 1954. Resistance Welder Manufacturers' Association, 505 Arch St., Philadelphia. $0.10.

Bulletin No. 19 on spot, seam and flash welding of titanium; cobalt-base alloys; refractory metals; zinc and zinc die castings; lead and lead alloys; and dissimilar metals. (K3, EG-d, Ti, Co, Zn, Pb)

435-K. (Book.) **Metals and How to Weld Them.** T. B. Jefferson and Gorham Woods. 322 p. 1954. The James F. Lincoln Arc Welding Foundation, 12818 Coit Rd., Cleveland 17, Ohio. $2.00.

Mechanical and physical properties of metals, metallurgical significance in heat treating and welding, welding procedures and trouble shooting. (K general)

436-K. (Book—Russian.) **The Electric Arc Welding of Carbon and Alloy Structural Steels.** A. S. Ogievetski. 384 p. 1948. Government Scientific-Technical Publishing House, Moscow.

Detailed discussion on electrode coatings and welding processes. (K1, ST)

L

Cleaning, Coating and Finishing

506-L. Porcelain Enameled Aluminum, a Competitive Product. II. D. R. Goetchius. *Ceramic Industry,* v. 62, May 1954, p. 72-73, 103.

Enameling processes, details of costs as compared with enameling on steel and relative merits as a competitive item. Photographs. (L27, Al)

507-L. Electrodeposition of Copper From the Triethanolamine Bath. T. L. Rama Char and N. B. Shivaraman. *Indian Institute of Science, Journal,* v. 36, sec. A, Apr. 1954, p. 111-116.

Plating on steel from solutions containing copper oxalate, nitrate, citrate, tartrate and carbonate which do not deposit copper by immersion. Tables. 11 ref. (L17, Cu, ST)

508-L. Low Temperature Enamels and Their Application to Aluminium. *Industrial Finishing (London),* v. 6, Apr. 1954, p. 630-634.

Advantages of various compositions. Conditions to be satisfied in preparation. 21 ref. (L27, Al)

509-L. Sealing Metal Surfaces With Resins. A. E. Williams. *Industrial Finishing (London),* v. 6, Apr. 1954, p. 635-641.

Ethoxyline resins offer good surface protection for magnesium, aluminum, bronze and ferrous metals. Photographs, tables. (L26, Mg, Al, Cu, ST)

510-L. Better Properties Extend Uses for Porcelain Enamels. W. A. Barrows. *Iron Age,* v. 173, May 13, 1954, p. 121-124.

Problems involving heat, corrosion, thermal shock and other service conditions are being solved. On cold rolled steel, coatings stand repeated shocking from 1000 to 60° F. Industrial enamels resist sulfuric and muriatic acids. Photographs, table. (L27)

511-L. Finishing Supplement. The British Electro-Plating Industry. H. Silman. *Metal Industry,* v. 84, Apr. 30, 1954, p. 349-352.

Improvements in plant and equipment; new methods of construction to reduce maintenance costs. Table, micrograph, photographs, diagrams. (L17)

512-L. The Effect of Chromate Films on the Corrosion Resistance of Hot Dip Galvanize in Brine. Frank J. Bubsey. *Metal Progress,* v. 65, May 1954, p. 122-124.

Beneficial lowering of corrosion. Method is simple and economical. Graphs, table, photograph. (L14, L16, CN)

513-L. New Zinc-Rich Paint Gives Real Rust Protection. *Power Engineering,* v. 58, May 1954, p. 87.

Electrochemical action enables new coating to give metals same protection as galvanizing. Diagram. (L26, Zn)

514-L. They're Using a New Method to Bond Steel to Aluminum. *Precision Metal Molding,* v. 12, May 1954, p. 49-50.

Stainless steel stampings prebonded by immersion in molten aluminum. Photographs. (L22, Al, ST)

515-L. (French.) **Poisoning of a Platinum-Platinum Electrode by Small Quantities of Electrolytically Deposited Cadmium.** Maurice Bonnemay. *Comptes rendus,* v. 238, no. 14, Apr. 5, 1954, p. 1512-1513.

Action of cadmium deposited in a cadmium sulfate and sulfuric acid bath. (L17, Cd)

516-L. (French.) **Electrolytic Tinning.** J. P. Gustin. *Metallurgia italiana,* v. 46, no. 2, Feb. 1954, p. 54-61.

Characteristics and fields of application of various processes. Diagrams, photographs. (L17)

517-L. (German.) **Experimental Investigation in Metal Spraying.** A Matting and K. Becker. *Schweissen und Schneiden,* v. 6, no. 4, Apr. 1954, p. 127-142.

Photographic study of process within the nozzle. Table, photographs, graphs, diagrams. 57 ref. (L23)

518-L. (German.) **The Behavior of Zinc Anodes in Cyanide Baths.** Willi Machu, A. M. Azzam and G. M. Habashi. *Werkstoffe und Korrosion,* v. 5, no. 4, Apr. 1954, p. 129-136.

Stable surface layer formed as result of reciprocal action of electrolytes. Passive zinc anodes show highest degree of polarization. Graphs, tables. 5 ref. (L17, Zn)

519-L. (German.) **Protective Lead Paint Coatings.** Oscar Neuss. *Werkstoffe und Korrosion,* v. 5, no. 4, Apr. 1954, p. 139-140.

Weathering tests substantiate protective value compared with oil-base paints. (L26)

520-L. (Italian.) **Cold and Anodic Oxidation of Cadmium. Researches on the Film Structure.** G. Bianchi. *Metallurgia italiana,* v. 46, no. 2, Feb. 1954, p. 49-53.

Investigation on nature and relationship of orientation of films with the base metal. Micrographs, tables, diffraction patterns. 8 ref. (L19, M26, Cd)

521-L. (Russian.) **Surface Activity of Phenols and Amines on Zinc and Lead Electrodes.** G. Z. Kir'iakov. *Doklady Akademii Nauk SSSR,* v. 94, no. 6, Feb. 21, 1954, p. 1097-1099.

Influence of organic compounds on kinetics of electrode processes and as depositing substance during electrolysis of acid solutions of lead sulfamate and zinc sulfate. Graphs. 3 ref. (L17, Pb, Zn)

522-L. (Russian.) **Chromium Plating of Cutting Tools.** M. I. Andrianov. *Stanki i Instrument,* v. 25, no. 2, Feb. 1954, p. 21-23.

Preparation of surface before plating. Diagrams. (L14, Cr, TS)

523-L. (Russian.) **Problem of Porosity in Electroplating.** L. S. Sapiro. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 1, Jan. 1954, p. 26-29.

Formation of gas bubbles on cathode and control measures. Diagrams. 8 ref. (L17)

524-L. (Russian.) **Influence of Thiocarbamide on Electrocrystallization of Copper.** L. I. Antropov and S. Ia. Popov. *Zhurnal Prikladnoi Khimii,* v. 27, no. 1, Jan. 1954, p. 55-63.

Cathodic and anodic polarization in acid copper baths. Graphs, micrographs. 33 ref. (L17, Cu)

525-L. (Russian.) **Potentials of Separation of Nickel and Theory of Retarded Ion Discharge.** A. L. Rotinian, V. Ia. Zel'des, E. Sh. Ioffe and E. S. Kozich. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 1, Jan. 1954, p. 73-80.

Cathode yields as function of pH at various concentrations of sodium chloride in the electrolyte. Graphs. 24 ref. (L17, Ni)

526-L. (Russian.) **Mechanism of Effect of Surface-Active Substances on Electrodeposition of Metals.** A. I. Levin, E. A. Ukshe and V. S. Kolevatova. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 1, Jan. 1954, p. 116-126.

Position of null point of the metal influences change of equilibrium potentials. Tables, graphs. 19 ref. (L17)

527-L. (Russian.) **Influence of Potassium Ions on Electrodeposition of Copper.** S. V. Gorbachev and R. M. Vasenin. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 1, Jan. 1954, p. 135-146.

Polarization of copper electrode, current density and activation energy of conductivity. Graphs, diagrams. 21 ref. (L17, Cu)

528-L. (Russian.) **Dispersibility of Complex Copper Electrolytes Containing Enthanolamines.** A. V. Izmailov and S. V. Gorbachev. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 2, Feb. 1954, p. 229-235.

Effect of amount of addition, temperature, energy of activation and electrode potential. Graphs, diagrams. 6 ref. (L17, Cu)

529-L. (Russian.) **Dispersibility of Complex Copper Electrolytes Containing Sodium Pyrophosphate.** S. V. Gorbachev and A. V. Izmailov. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 2, Feb. 1954, p. 236-239.

Effects of various concentrations on distribution of metal on the carbon cathode. Graphs. 3 ref. (L17, Cu)

530-L. (Swedish.) **Reconditioning Worn Drills by Hard-Surfacing.** Tage Larsson. *Svetsaren,* v. 18, no. 4, 1953, p. 55.

Welding procedure. Photographs. (L24, TS)

531-L. Rusty Stock Recelaimed. C. N. Calvin. *Bureau of Ships Journal,* v. 3, May 1954, p. 32-34.

Six minutes in "Tumblast" and unfit-for-issue stock looks brand new. Photographs. (L10)

532-L. Internal Coating of Pipe in Place. M. B. Grove. *Corrosion,* v. 10, May 1954, p. 142-146.

Procedures and results of plastic coating inside of old aluminum, steel and new steel pipe. Diagram. (L26, Al, ST)

533-L. Effects of Addition Agents on the Cathode Polarization Potential During the Electro-Deposition of Copper. L. L. Shreir and J. W. Smith. *Faraday Society, Transactions,* v. 50, Apr. 1954, p. 393-403.

Includes graphs, tables. 15 ref. (L17, Cu)

534-L. One-Coat White Enamel. J. Semple. *Foundry Trade Journal,* v. 96, May 6, 1954, p. 533-537.

Characteristics and composition of material. Effect of super-opaque enamels on plant and material utilization. Graphs. (L27)

535-L. Plating Setup Recycles Propellers for Proper Balance. C. B. Conwell and C. J. Stansfield. *Iron Age,* v. 173, May 20, 1954, p. 133-135.

New zinc-plating installation speeds operation 30 to 50%; deposits are more consistent. Photographs, diagram. (L17, Zn)

536-L. Sprayed Metals. D. A. Watson. *Machine Design,* v. 26, May 1954, p. 166-170.

Basic characteristics of present-day process, end results to be expected. Photographs, tables. (L23)

537-L. Prefinished Metals. C. P. Stewart. *Machine Design,* v. 26, May 1954, p. 174-176.

Characteristics and applications of preplated metals. Photographs, table. (L17, Cr, Ni, ST, Cu, Zn, Al)

538-L. Precious-Metal Laminates. W. Channing and G. H. Barney. *Machine Design,* v. 26, May 1954, p. 180-183.

Bonding of precious metals to copper alloy base metals by heat and pressure, to give desirable electrical properties and corrosion resistance. (L22, EG-c, Cu)

539-L. Stop-Offs in Hard Chrome Plating. Arthur W. Logozzo. *Metal Finishing,* v. 52, May 1954, p. 56-60.

Tools, methods and materials, use of lead foil and plastic sheet. Photographs. (L17, Cr)

540-L. Surface Treatment and Finishing of Light Metals. II. Corrosion and Protection of Aluminum. S. Wernick and R. Pinner. *Metal Finishing,* v. 52, May 1954, p. 71-77.

Protection by metal spraying and oxide films. Properties of various coatings. Tables, photograph. 68 ref. (L23, L14, Al)

541-L. The Efficiency of Some Protective Treatments in Preventing the Oxidation of Mild Steel at High Temperatures. A. H. Sully, E. A. Brandes and R. H. Brown. *Metallurgia,* v. 49, no. 294, Apr. 1954, p. 165-168.

Effectiveness of chromizing, aluminum coating or enameling steel to protect it against oxidation when heated to 700° C. for 1000 hr. Tables, graphs. 2 ref. (L14, L27, CN)

542-L. How to Clean Titanium Sheet for Spot Welding. E. R. Funk. *Modern Metals,* v. 10, May 1954, p. 70, 72-73.

Effective descaling procedure. Diagram, graph, photograph. (L10, K3, Ti)

543-L. Impermeable Organic Coatings. F. S. Stewart. *Organic Finishing,* v. 15, May 1954, p. 8-10.

Mechanism of drying, indications of impermeability and chemical resistance of certain single layer films. Graph, photographs. (L26)

544-L. Continuous Strip Galvanizing in Argentina. C. R. W. Hughes. *Sheet Metal Industries,* v. 31, no. 325, May 1954, p. 359-366.

Modernization effected; operation of plant. Photographs. (L16, Zn)

545-L. Plating Nickel on Aluminum. Sam Baker. *Steel,* v. 134, May 24, 1954, p. 115-116.

New system gives better resealing qualities on hermetically sealed parts. Tables, photographs. (L17, Al, Ni)

546-L. The Applications of Blast Cleaning in Steel Processing. III. Victor F. Stine. *Steel Processing,* v. 40, May 1954, p. 307-311.

Nonmetallic and metallic abrasives with production equipment used for testing cleaning methods. Photographs. (L10)

547-L. (Czech.) Burning Out Defects in Steel Castings by Carbon Electrode. Karel Maly. *Slévarenstvi,* v. 2, no. 2, Feb. 1954, p. 51-53.

Mechanical cleaning in preparation for welding of defects. Efficiency of method. Photographs. (L10, K general, CI)

548-L. (French.) Electrolytic Deposits of Tin Alloys. J. W. Cuthbertson. *Metallurgia italiana,* v. 46, no. 3, Mar. 1954, p. 85-90.

Experiments on zinc, copper, nickel, cobalt and antimony alloys of tin. (L17, Sn, Zn, Cu, Ni, Co, Sb)

549-L. (French.) Enamelling of Light Metals With Vitrified Enamel. II. F. J. Biechler, J. J. Meynis de Paulin. *Revue de l'Aluminium,* v. 31, no. 209, Apr. 1954, p. 135-318.

Preparation of metal and enamel, cause of defects. 4 ref. (L27, Al)

550-L. (French.) Application of Hard Chrome Plating to Aluminum and Its Alloys. Charles Etienne. *Revue de l'Aluminium,* v. 31, no. 209, Apr. 1954, p. 139-143.

Friction properties, surface hardness, abrasion resistance and resistance to alkaline solutions. Tables, graph, photographs. 3 ref. (L17, Q9, Q29, Cr, Al)

551-L. (German.) Status of Varnish and Paint Techniques in the Field of Protection Against Corrosion. G. Sprock. *Fette, Seifen, Anstrichmittel,* v. 56, no. 4, Apr. 1954, p. 238-241.

Protective effects, compositions, properties of basic raw materials. Tables. (L26)

552-L. (German.) Electropolishing With Rectified Current. J. Steiner. *Metalloberfläche,* Ausgabe B, v. 6, no. 5, May 1954, p. 65-69.

Results on copper, brass, stainless steel and aluminum in different electrolytes. Graphs, diagrams, photographs. 6 ref. (L13, Cu, Zn, SS, Al)

553-L. (German.) Crack-Free Chromium Deposits. Heinz W. Dettner. *Metalloberfläche,* Ausgabe B, v. 6, no. 5, May 1954, p. 69-73.

Increased corrosion resistance and improved polishing properties. Micrographs, tables. 20 ref. (L14, Cr)

554-L. (German.) Further Development of Metal Spraying Technique. Hans Reininger. *Metalloberfläche,* Ausgabe B, v. 6, no. 5, May 1954, p. 73-75.

Literature review. Desirable and undesirable effects of oxides in structure of coatings. Tables, micrographs. 23 ref. (L23, Fe, Zn)

555-L. (German.) The Application of Enamel. Rudolf Märker. *Silikat Technik,* v. 5, no. 3, Mar. 1954, p. 136-138.

Proper application on different types of ware. Table. 2 ref. (L27)

556-L. (Russian.) Investigation of Thin Coatings of Protective Greases for Preservation of Steel Objects. V. V. Skorchelletti, A. I. Bukhbinder and V. E. Piskorskii. *Zhurnal Prikladnoi Khimii,* v. 27, no. 4, Apr. 1954, p. 454-456.

Effectiveness of grease containing aluminum oleate. Tables. 1 ref. (L26, ST)

557-L. Ionic Mass Transfer and Concentration Polarization at Rotating Electrodes. M. Eisenberg, C. W. Tobias and C. R. Wilke. *Electrochemical Society, Journal,* v. 101, June 1954, p. 306-319.

Transfer rates at nickel electrodes rotating about their axes in center of stationary electrodes were studied using ferri-ferrocyanide couple in alkaline solutions. Photographs, diagram, graphs, tables. 48 ref. (L17, Ni)

558-L. The Nature of the Zinc-Containing Ion in Strongly Alkaline Solutions. Thedford P. Dirkse. *Electrochemical Society, Journal,* v. 101, June 1954, p. 328-331.

Electrode potentials of zinc in solutions under equilibrium conditions were measured by potentiometric method. Graphs. 6 ref. (L17, Zn)

559-L. Let's Hard Face It! Harvey S. Miller. *Industry & Welding,* v. 27, June 1954, p. 41-44, 82-83.

Economies, equipment and facts to consider in hard facing. Photographs. (L24)

560-L. Metallic Coatings on Steel. D. L. Phillips. *Iron and Steel Institute; Papers of the Affiliated Local Societies, Special Report no.* 49, Feb. 1954, p. 1-8 + 4 plates.

Investigations of application and properties of coatings. Graph, diagram, micrographs. (L general, ST)

561-L. Government Finishing Specifications. N. E. Promisel and David M. Promisel. *Metal Finishing,* v. 52, May 1954, p. 61-70.

An explanation and digest relating to metal coatings and surface treatments other than organic coatings. (To be continued.) (L general, S22)

562-L. The Blast Cleaning of Metal Surfaces. Victor F. Stine. *Metal Progress,* v. 65, June 1954, p. 104 + 6 pages.

Sand, wet sand, shot, grit, hydrosand and liquid blasting. Photographs. (L10)

563-L. Metal Cleaning. K. G. Lewis. *Metal Treatment and Drop Forging,* v. 21, May 1954, p. 207-214.

Removal of scale from forgings. Micrographs, diagram. 42 ref. (To be continued). (L10)

564-L. (Russian.) Problem of Electrolytic Separation of Light Metals Out of Anhydrous Solutions at Ordinary Temperatures. D. A. Pospekhov. *Zhurnal Prikladnoi Khimii,* v. 27, no. 5, May 1954, p. 552-557.

Catalytic reactions carried out in halide solutions. 57 ref. (L17, Al)

565-L. (Book.) Handbook of Industrial Electroplating. E. A. Ollard and E. B. Smith. 364 p. 1954. Iliffe and Sons, Ltd., London. 31s. 2d.

Design, erection, and operation of electrodeposition plant. Testing and maintenance of plating solutions. (L17)

566-L. (Book.) Specifications and Tests for Electrodeposited Metallic Coatings. 96 p. 1953. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $1.85.

Jointly prepared with American Electroplaters Society. Various procedures included. (L17, S22)

567-L. (Book.) Study of Hard Coating for Aluminum Alloys. Wright Air Development Center. Report No. PB 111320. 121 p. 1953. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $2.00.

High resistance to abrasion but serious lowering of fatigue strength of the parent metal are effects of hard oxide coatings. (L14, Q7, Q9, Al)

M

Metallography, Constitution and Primary Structures

209-M. Valence Bond Calculations. L. A. Schmid. *American Journal of Physics,* v. 22, May 1954, p. 255-263.

Nature of binding in molecular and ionic crystals and in metals. Features of the Slater-Pauling theory. Diagrams. 7 ref. (M26)

210-M. Studies on the Texture of Crystals. I. NaCl, KCl and MgO. V. M. Padmanabhan. *Indian Institute of Science, Journal,* v. 36, sec. A, Apr. 1954, p. 104-110 + 1 plate.

X-rays of cubic crystals suggest new method of texture study. Graphs, photographs. 11 ref. (M26, M23)

211-M. Thermionic and Surface Properties of Tungsten Crystals. George F. Smith. *Physical Review,* v. 94, ser. 2, Apr. 15, 1954, p. 295-308.

Plateau-like surface structure found. "Shingle" structure observed superimposed upon plateaus. Photograph, micrographs, tables, graphs, diagrams. 40 ref. (M26, P15, W)

212-M. Interferometric Observation of Mosaic Structure on the (111) Face of a Single Crystal of Germanium. Ajit Ram Verma. *Physical Society, Proceedings,* v. 67, no. 412B, Apr. 1, 1954, p. 359-360 + 1 plate.

Surface study by microscopic and interferometric techniques. Micrographs. 5 ref. (M26, Ge)

213-M. (French.) **An Electrolytic Method of Producing Etch Patterns on Alpha Copper-Zinc Solid Solutions.** Pierre A. Jacquet. *Comptes rendus,* v. 238, no. 14, Apr. 5, 1954, p. 1508-1510.

Solution of 2% sodium hyposulfate heated to 50° C. reveals traces of plastic deformation and polygonization. Micrographs. 4 ref. (M21, Q24, Cu, Zn)

214-M. (Italian.) **Examination of Metal Surfaces With the Electron Microscope and by Electron Diffraction. Experimental Part.** K. Huber. *Metallurgia italiana,* v. 46, no. 2, Feb. 1954, p. 41-48.

Methods used on zinc surfaces. Diffraction patterns, micrographs. (M21, M22, Zn)

215-M. (Russian.) **Superheating of a Solid Body in Vacuum.** D. S. Kamenetskaia and I. B. Piletskaia. *Doklady Akademii Nauk SSSR,* v. 94, no. 4, Feb. 1, 1954, p. 689-691.

Constitution diagrams of magnesium, zinc, cadmium, manganese and aluminum in pressure-temperature coordinates. Graph, table. 2 ref. (M24, Mg, Zn, Cd, Mn, Al)

216-M. (Russian.) **Electron Diffraction Investigation of Thin Films of Silver.** A. I. Bublik, *Doklady Akademii Nauk SSSR,* v. 95, no. 3, Mar. 21, 1954, p. 521-523 + 1 plate.

Observations of hexagonal lattice. Dependence of film structure on rate of evaporation and thickness of film. Tables, photographs. 6 ref. (M22, Ag)

217-M. (Russian.) **Electronographic Investigation of Structure of Cubic Iron Nitride.** Z. G. Pinsker and S. V. Kaverin. *Doklady Akademii Nauk SSSR,* v. 95, no. 4, Apr. 1, 1954, p. 797-799 + 1 plate.

Instrument and method of investigation permits differentiation of lines. Table, radiograms. 2 ref. (M21, Fe)

218-M. (Russian.) **Diagram of Solubility of the System Ni-Cr-NiAl.** I. I. Kornilov and R. S. Mints. *Doklady Akademii Nauk SSSR,* v. 94, no. 6, Feb. 21, 1954, p. 1085-1088 + 1 plate.

Microstructure and thermal analysis studies. Diagram, micrographs. 6 ref. (M24, Ni, Cr, Al)

219-M. (Russian.) **X-Ray Analysis of Structure of Chips Resulting From Metal Cutting.** S. I. Gubkin and L. T. Mendeleev. *Doklady Akademii Nauk SSSR,* v. 95, no. 1, Mar. 1, 1954, p. 73-74 + 1 plate.

Copper, aluminum, bronze and steel chips show same structure as forged, rolled or stamped parts. Radiograms. 2 ref. (M27, G17, Cu, Al, ST, Zn)

220-M. (Russian.) **Adsorption of Additions on the Boundaries of Blocks in Aluminum.** I. E. Bolotov and Iu. D. Kozmanov. *Doklady Akademii Nauk SSSR,* v. 95, no. 2, Mar. 11, 1954, p. 293-295.

Investigation indicates adsorption of iron and silicon between mosaic blocks in critically deformed commercial grade aluminum. 2 ref. (M26, Al)

221-M. (Russian.) **Problem of the Compound Ni_2Cr.** I. I. Kornilov and R. S. Mints. *Doklady Akademii Nauk SSSR,* v. 95, no. 3, Mar. 21, 1954, p. 543-545.

Microstructural analysis, electrical resistance, dilatometry and X-ray phase analysis. Table, graphs. 6 ref. (M27, M23, M24, P15, Cr, Ni)

222-M. (Russian.) **New Method of Producing Test Specimens of Varying Composition and Possibilities for Its Application.** D. A. Petrov and A. A. Bukhanova. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 1, Jan. 1954, p. 161-173 + 2 plates.

Extraction of solid phase from aluminum-copper alloy melts to study phase relations in complex mixtures. Diagrams, graphs, micrographs. 2 ref. (M23, Al, Cu)

223-M. (English.) **The Determination of the Ms Temperature by Dilatometric Method.** Hideo Nishimura and Toshishige Mitani. *Memoirs of the Faculty of Engineering, Kyoto University,* v. 16, no. 1, Jan. 1954, p. 1-7.

Technique for accurate determination. Graphs, diagrams, micrographs. 2 ref. (M23, ST)

224-M. Statistical Mechanics of Two-Component Interstitial Solid Solutions. A. L. G. Rees. *Faraday Society, Transactions,* v. 50, Apr. 1954, p. 335.

Theory is applicable to any nonstoichiometric system in which one component is volatile or gaseous. Graphs. 8 ref. (M26)

225-M. A Redetermination and Interpretation of the Titanium-Rich Region of the Titanium-Chromium System. M. K. McQuillan. *Institute of Metals, Journal,* v. 82, May 1954, p. 433-439 + 1 plate.

Phase boundaries in composition range 0.14 at. % chromium. Present and previous micrographic results differ due to insufficiently rapid quenching in earlier experiments. Diagram, micrographs. 13 ref. (M24, Ti, Cr)

226-M. X-Ray Determination of the Alpha-Phase Boundary of the Copper-Indium Alloys System. R. O. Jones and E. A. Owen. *Institute of Metals, Journal,* v. 82, May 1954, p. 445-448.

Maximum solubility of indium in copper is 10.85 at. % and is found to occur at 575° C. Boundary below 575° C. shows a point of inflection, suggesting a transformation at about 470° C. Tables, graph. 8 ref. (M24, Cu, In)

227-M. The System Uranium-Mercury. B. R. T. Frost. *Institute of Metals, Journal,* v. 82, May 1954, p. 456-462.

Alloy system examined over composition range from −40 to 1000° C. by means of X-ray, thermal and low-temperature micrographical analysis. Diagrams, tables. 15 ref. (M24, U, Hg)

228-M. The Ternary Compound *E* in the System Aluminium-Chromium-Magnesium. K. Little. *Institute of Metals, Journal,* v. 82, May 1954, p. 463-464.

Single crystals of approximate composition $CRMg_{1.5}Al_{12}$ were examined goniometrically and by X-rays. Micrographs. 5 ref. (M26, Al, Cr, Mg)

229-M. A Simple Method of Obtaining Low-Temperature X-Ray Diffraction Photographs. S. C. Wallwork and T. T. Harding. *Journal of Scientific Instruments,* v. 31, May 1954, p. 163-164.

Crystal mounted in the usual way on an oscillation goniometer may be maintained at a temperature of −30 to −60° C. No precautions against ice formation necessary. Diagram. 16 ref. (M22)

230-M. Metallography With the Electron Microscope. J. Nutting. *Metal Treatment and Drop Forging,* v. 21, May 1954, p. 243-250.

Capabilities, aims and limitations of instruments. Micrographs, table, diagrams. 18 ref. (M21)

231-M. On the Structure of Crystals of Martensite in Hardened Steel. M. P. Arbuzov, L. I. Lysak and E. G. Nesterenko. *National Science Foundation Translation, no.* 153, Jan. 1954, 3 p. (From *Doklady Akademii Nauk SSSR,* v. 90, 1953, p. 375-377.)

Previously abstracted from original. See item 415-M, 1953. (M22, M26, CN)

232-M. A Remarkable Etching of Copper. J. J. de Jong. *Philips Technical Review,* v. 15, Feb.-Mar. 1954, p. 238-240.

Principles and process of preparing metal for microscopic examination. Photomicrograph. 3 ref. (M21, Cu)

233-M. (French.) **The Appearance of a Particular Type of Surface Microstructure in a Nickel-Chromium Alloy Subjected to Selective Oxidation Reaction.** Jacques Benard and Jean Moreau. *Comptes rendus,* v. 238, no. 16, Apr. 21, 1954, p. 1659-1661.

Changes in surface under various atmospheres and temperatures. Micrographs. 4 ref. (M27, Ni, Cr)

234-M. (French.) **Examination of Superfinish Mechanism in the Electron Microscope.** Noboru Takahashi and Toshio Asaeda. *Métaux, Corrosion—Industries,* v. 29, no. 343, Mar. 1954, p. 95-99.

Studies of ground and superfinished high-chromium and carbon steels. Graphs, micrographs. 4 ref. (M27, G19, CN, AY)

235-M. (French.) **Evolution of Structure and Properties During Tempering of Rolled Alloy RR57.** Ch. Renon-Changarnier and J. Calvet. *Recherche Aéronautique,* 1954, no. 38, Mar.-Apr. p. 23-42.

Stabilization of Al_2Cu precipitates by manganese and titanium in aluminum-copper sheets tempered at various temperatures. Tables, graph, micrographs. 13 ref. (M27, J29, Al, Cu)

236-M. (German.) **The Behavior of Oxygen Towards Molten Silver-Lead Alloys.** Ernst Justus Kohlmeyer and Helmut Hennig. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 4, Apr. 1954, p. 153-161.

Effects of oxygen on structure of various alloys. Photographs, tables, graphs, micrographs. 16 ref. (M27, Pb, Ag)

237-M. (Italian.) **Phase-Contrast Microscopy in Metallography and Mineralogy.** R. Mitsche. *Metallurgia italiana*, v. 46, no. 3, Mar. 1954, p. 79-84.

Techniques and etchants for various materials. Photographs, micrographs. (M21, SS, Cr, W, V, Ni)

238-M. (Russian.) **Electronographic Investigation of Thin Films of Mg-Sb, Mg-Bi, and Mg-Sn Alloys.** G. A. Kurov and Z. G. Pinsker. *Doklady Akademii Nauk SSSR*, v. 94, no. 3, Jan. 21, 1954, p. 439-441 + 1 plate.

Electronograms obtained by reflection and "passage", using metal films sublimated on thin celluloid strips. Photograph. 3 ref. (M23, Mg, Sb, Bi, Sn)

239-M. (Russian.) **New Method of Observing Ultra-Fine Elements of Relief of a Crystal Face.** G. G. Lemmlein and N. V. Gliki. *Doklady Akademii Nauk SSSR*, v. 94, no. 3, Jan. 21, 1954, p. 473-475 + 1 plate.

Electronographic investigation of structure of ammonium chloride "dew" on faces of silicon carbide crystals shows spiral-layer structure is characteristic of these crystals. Photographs, diagrams. 4 ref. (M23, M26)

240-M. (Spanish.) **Metallographic Identification of the Sigma Phase in One Ferritic Chromium Steel and Two Austenitic Chromium-Nickel Steels. I. Introduction. Experiences With Ferritic Chromium Steel.** Francisco Joanxich Ayma. *Revista de ciencia aplicada*, v. 8, no. 36, Jan.-Feb. 1954, p. 18-34.

Formation of sigma phase between 500 and 800° C. and its effect on hardness. Graphs, micrographs, tables. (M27, Q29, AY, SS)

241-M. Sigma—an Unwanted Constituent in Stainless Weld Metal. Lorin K. Poole. *Metal Progress*, v. 65, June 1954, p. 108-112.

Formation. Control, either by selection of proper electrode or by periodic high-temperature heat treatment. Identification of sigma. Micrographs, graphs. (M26, K1, SS)

242-M. Structure of Optically Active Compounds in the Solid State. J. M. Bijvoet. *Nature*, v. 173, May 15, 1954, p. 888-891.

Heavy-atom technique of phase determination in form of isomorphous substitution method. Diagrams. 10 ref. (M23)

243-M. On the Theory of X-Ray Small-Angle Scattering. Yin-Yuan Li and R. Smoluchoski. *Physical Review*, v. 94, ser. 2, May 15, 1954, p. 866-871.

Analysis of scattering in a supersaturated aluminum-silver alloy. Approximate formulas which fit experimental data. Graphs. 16 ref. (M22, Al, Ag)

244-M. (English.) **Morphology of ZnO Crystals Formed on the Surface of Brass or Zinc at High Temperatures.** Riitsu Takagi. *Physical Society of Japan, Journal*, v. 9, no. 2, Mar.-Apr. 1954, p. 162-168.

Electron-microscope shows thin needles projecting on surface of brass or zinc heated in air. Micrographs, radiograms, diagrams. 20 ref. (M26, Cu, Zn)

245-M. (English.) **Fine Structure Due to Refraction Effect in Electron Diffraction Pattern of Powder Sample. II. Multiple Structures Due to Double Refraction Given by Randomly Oriented Smoke Particles of Magnesium and Cadmium Oxide.** Goro Honjo and Kazuhiro Mihama. *Physical Society of Japan, Journal*, v. 9, no. 2, Mar.-Apr. 1954, p. 184-198.

Experimental study. Tables, graphs, diagrams, micrographs. 16 ref. (M22)

246-M. (English.) **Some Remarks on the Role of Overlapping in the X-Ray Scattering by Crystals.** I. Waller and S. O. Lundqvist. *Arkiv för Fysik*, v. 7, nos. 1-2, Jan. 30, 1954, p. 121-124.

Effect in a first approximation of overlapping between neighboring atoms or ions in a crystal consisting of atoms or ions having complete electron shells. Table, graph. (M26)

247-M. (French.) **Study of the Hexagonal Carbonitride of Iron (Fe_3N Type).** R. Bridelle and A. Michel. *Revue de métallurgie*, v. 51, no. 4, Apr. 1954, p. 278-282; disc., p. 282.

Structural and thermomagnetic study of lattice parameters and Curie point variation with carbon and nitrogen content. Graphs, tables. 4 ref. (M26, P16, Fe)

N

Transformations and Resulting Structures

200-N. Melting and Freezing. Bruce Chalmers. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 519-532.

Experimental and theoretical studies of phenomena emphasize structure of resulting metal. Tables, diagrams, graphs, micrographs. 15 ref. (N12)

201-N. A Rationalization of the Oxygen Solid Solubility in Some Transition Metals. A. U. Seybolt and R. L. Fullman. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 548-549.

Results of experimental studies. Table, graph. 8 ref. (N12)

202-N. Primary and Secondary Recrystallization in Cold Rolled Bicrystals of Silicon Iron. C. G. Dunn. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 549-550.

Traces origin of secondary recrystallization grains produced on annealing a cold rolled bi-crystal specimen. Micrograph. 6 ref. (N5, AY)

203-N. Role of Strain Energy in Solid Solution Thermodynamics. E. S. Machlin. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 592-593.

Mathematical analysis. Table. 5 ref. (N12, P12)

204-N. Investigation of the Grain Coarsening Behavior of Some Aluminum Alloys. Harold Bernstein. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 603-606.

Effects of melt composition; pour temperature and mold temperature. Results support carbide theory of nucleation as opposed to peritectic theory. Tables, graphs, photographs. 6 ref. (N2, N3, Al)

205-N. Determination of the Self-Diffusion Coefficients of Gold by Autoradiography. Harry C. Gatos and Anthony D. Kurtz. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 616-619.

Materials, apparatus, techniques and results of experimental studies. Diagram, graphs. 5 ref. (N1, Au)

206-N. Allotropic Transformations at High Temperature. James O. McCaldin and Pol Duwez. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 619-620.

Equipment and techniques of experimental studies. Graph, diagram. 6 ref. (N6, V, Co, Cr, Ru, Re, Os, Rb, Ir, Mo, Th)

207-N. Solubility of Oxygen in Alpha Iron. A. U. Seybolt. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 641-644.

Solubility, a function of temperature, varies from about 0.008% oxygen at 700° C. to about 0.03% at 900° C. Graphs, tables, micrographs. 16 ref. (N12)

208-N. Growth and Surface Properties of Tantalum Crystals. M. H. Nichols. *Physical Review*, v. 94, ser. 2, Apr. 15, 1954, p. 309-313.

Method consists of moving temperature gradient for producing centimeter-long crystals in commercial tantalum wire. Photographs, diagrams, table, micrographs. 15 ref. (N12, P10, Ta)

209-N. Experimental Study of the Variation of the Degree of Order With Temperature in a Copper-Palladium Alloy. D. Madoc Jones and E. A. Owen. *Physical Society, Proceedings*, v. 67, no. 412B, Apr. 1, 1954, p. 297-303.

X-ray study of alloy Cu_3Pd, with reference to variation of degree of order with temperature as revealed by degree of tetragonality at different temperatures. Graphs, table. 2 ref. (N10, Cu, Pd)

210-N. (English.) **The Practical Use of a Three-Dimensional Welchelt Diagram for Alloyed Cast Iron.** Ant. W. van den Bergh. *Metalen*, v. 9, no. 7, Apr. 15, 1954, p. 103-106.

Diagram shows influence of silicon on graphitization of cast iron. Graphs. 11 ref. (N8, Si, CI)

211-N. (Russian.) **Diffusion of Cobalt, Chromium, and Tungsten in Iron and Steel.** P. L. Gruzin. *Doklady Akademii Nauk SSSR*, v. 94, no. 4, Feb. 1, 1954, p. 681-684.

Temperature dependence of diffusion coefficient in alpha and gamma phases of commercial iron and steel. Eutectoid composition in temperature range between 700 and 1250° C. Tables, graphs. 6 ref. (N1, Co, Cr, W, Fe, ST)

212-N. (Russian.) **Influence of Elements Forming Slightly Soluble Carbides on the Dissociation of Austenite.** L. I. Kogan and R. I. Entin. *Doklady Akademii Nauk SSSR*, v. 94, no. 4, Feb. 1, 1954, p. 693-696.

Kinetics of dissolution of titanium, columbium and vanadium additions and their influence on stability of austenite during heat treatment. Table, graphs. 4 ref. (N8, AY)

213-N. (Russian.) **Diffusion of Silver in Iron-Palladium Alloys and Internal Adsorption of Palladium in Iron.** V. I. Arkharov and B. A. Iunikov. *Doklady Akademii Nauk SSSR*, v. 94, no. 6, Feb. 21, 1954, p. 1057-1060 + 1 plate.

Intercrystalline character of diffused silver. Micrographs. 5 ref. (N1, Ag, Fe, Pd)

214-N. (Russian.) **Formation of Graphite in Cast Irons Modified by Magnesium.** K. P. Bunin and Iu. N. Taran. *Doklady Akademii Nauk*

SSSR, v. 94, no. 6, Feb. 21, 1954, p. 1061-1063.

Influence of austenitic structure on shape of graphite particles. Micrographs. 5 ref. (N8, CI, Mg)

215-N. (Russian.) **Dissolving and Adsorption of Hydrogen by Dispersed Palladium-Silver Alloys.** Zh. L. Vert and I. P. Tverdovskii. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 2, Feb. 1954, p. 317-327.

Solubility of hydrogen at room temperature decreases uniformly according to increased silver content and reaches zero in alloys with 72 to 75% silver. Tables, graphs. 21 ref. (N12, Ag, Pd)

216-N. Interpretation of the Solubility of Hydrogen in Zirconium. S. L. H. Martin and A. L. G. Rees. *Faraday Society, Transactions*, v. 50, Apr. 1954, p. 343-352.

Pressure and temperature dependence. Effects of oxygen on initial solubility. Graphs. 13 ref. (N12, Zr)

217-N. Diffusion and Oxidation of Solid Metals. C. E. Birchenall. *Industrial and Engineering Chemistry*, v. 46, May 1954, p. 893-898.

Review of literature. 90 ref. (N1, R2)

218-N. Formation of Martensite in Austenitic Stainless Steels. Effects of Deformation, Temperature, and Composition. Tryggve Angel. *Iron and Steel Institute, Journal*, v. 177, May 1954, p. 165-174 + 1 plate.

Isothermal formation induced by plastic deformation studied in temperature range −188 to 100° C. Graphs, table, micrographs, diagram. 32 ref. (N8, Q24, SS)

219-N. Heat-Treatment of High-Speed Steel. V. Transformations on Tempering of High-Speed Steel. S. G. Cope. *Metal Treatment and Drop Forging*, v. 21, May 1954, p. 225-233.

Characteristics resulting from tempering after normal, arrested and subzero quenching. Graphs, table, micrographs. 18 ref. (N8, J29, TS)

220-N. (Czech.) **Graphitic Steel.** Vaclav Oliverius. *Slévarenstvi*, v. 2; *Prace Ceskoslovenského Vyzkumu Slévarenského*, v. 1, no. 2, Feb. 1954, p. 13-20.

Effect of composition and heat treatment on graphitization, mechanical properties and resistance to wear. Tables, graphs, micrographs, photograph. 19 ref. (N8, Q general, ST)

221-N. (Russian.) **Unique Texture of Growth Originating During Diffusion in Se-Cu and Te-Cu Systems.** V. I. Arkharov and Sabir Mardeshev. *Doklady Akademii Nauk SSSR*, v. 95, no. 3, Mar. 21, 1954, p. 517-519 + 1 plate.

Sealed, evacuated ampoules containing copper in upper part and fine selenium or tellurium powder in lower part were heated to 600° C. and held from 2 to 20 hr. for X-ray study of crystal growth. Photographs, micrographs. 3 ref. (N1, Se, Cu, Te)

222-N. (Russian.) **The Form of Temper Carbon Inclusions in Magnesium Cast Iron.** K. P. Bunin and A. V. Chernovol. *Doklady Akademii Nauk SSSR*, v. 95, no. 4, Apr. 1, 1954, p. 785-787.

White iron annealed at 850, 950 and 1050° C. Structure of metal matrix determines form of graphite inclusions. Micrographs. 6 ref. (N8, CI)

223-N. (Russian.) **Solubility of Iron in Liquid Slags.** P. M. Shurygin and O. E. Esin. *Doklady Akademii Nauk SSSR*, v. 95, no. 5, Apr. 11, 1954, p. 1043-1045.

Formation of true solution of iron in oxide slags shown by formation of gold-iron alloys when a drop of gold is introduced into molten FeO-Fe_2O_3 mixture in magnesite crucibles. (N14, Fe)

224-N. (Russian.) **Sintering, Creep, Relaxation, Recrystallization, and Other Phenomena Connected With Self Diffusion in Crystalline Bodies.** B. Ia. Pines. *Uspekhi Fizicheskikh Nauk*, v. 52, no. 4, Apr. 1954, p. 501-559.

Influence of plastic deformation on recrystallization. Creep of amorphous bodies. Diagrams, graphs, tables, micrographs. 36 ref. (N1, N5, Q24)

225-N. Phenomena Observed in the Melting and Solidification of Germanium. S. E. Bradshaw. *Electrochemical Society, Journal*, v. 101, June 1954, p. 293-297.

Molten spheres, weighing about 10 mg., are pear-shaped on freezing. Solidification mechanism to explain shape and impurity distribution. Graphs, photograph. 13 ref. (N12, Ge)

226-N. Diffusion in Bimetal Vapor-Solid Couples. R. W. Balluffi and L. L. Seigle. *Journal of Applied Physics*, v. 25, May 1954, p. 607-614.

Alpha brass, copper-nickel and silver-gold systems. Use and limitations of couples in diffusion studies. Micrographs, graphs, diagram, table. 16 ref. (N1, Cu, Ni, Ag, Au)

227-N. Cross Section of Pulled Crystals. Robert G. Pohl. *Journal of Applied Physics*, v. 25, May 1954, p. 668-669.

Equation for radius of a crystal grown by Czochralski technique. Considers mechanical and thermal equilibrium at liquid-solid interface. 6 ref. (N12)

228-N. (English.) **Precipitation in Lead-Tin Alloys.** T. J. Tiedema and W. G. Burgers. *Applied Scientific Research*, v. 4, sec. A, no. 4, 1954, p. 243-248 + 5 plates.

For slow rates of precipitation the resulting fine-grained material shows a texture related to orientation of original single crystal lattice. Graphs, micrographs, photographs. 6 ref. (N7, Sn, Pb)

229-N. (English.) **Nucleation of a Solid Precipitate Along a Dislocation.** Josef Nyström. *Applied Scientific Research*, v. 4, sec. A, no. 4, 1954, p. 266-272.

Different mobilities and sizes of atoms in the alloy give rise to different possibilities of growth of nuclei. 12 ref. (N2, Au, Ni, Cu, Zn, Be)

230-N. (English.) **The Production of Single Crystals of Metals and Alloys With Any Desired Orientation by Solidification at High Temperature.** Hideo Takaki, Shigeo Nakamura, Yoji Nakamura, Jun-ichi Hayashi, Kazuo Furukawa and Masato Aso. *Physical Society of Japan, Journal*, v. 9, no. 2, Mar.-Apr. 1954, p. 204-208.

Vacuum furnace and porcelain crucibles with no bottom are used to grow crystals with high melting points. Graphs, table, diagrams. 6 ref. (N12)

231-N. (German.) **Application of a Theory of Borelius, Concerning the Structural Connection Between the Solid and the Liquid State, to Iron.** O. Krisement and F. Wever. *Applied Scientific Research*, v. 4, sec. A, no. 4, 1954, p. 249-265.

Applies hypothesis to alpha and gamma iron. Agreement with experimental results. Tables, graphs. 14 ref. (N12, Fe)

232-N. (German.) **The Segregation of Carbon From Alpha Iron.** O. Krisement. *Arkiv för Fysik*, v. 7, no. 4, 1954, p. 353-355.

Calorimetric measurements to determine temperature range in which precipitation of Fe_3C is replaced by precipitation of other carbides. Table, graphs. 4 ref. (N7, Fe)

233-N. (Russian.) **Influence of Additives on Velocity of Contact Exchange Between Iron and Copper.** L. I. Antropov. *Zhurnal Prikladnoi Khimii*, v. 27, no. 5, May 1954, p. 527-532.

Velocity of contact displacement of copper by iron reduced by adding thiourea. Graphs. 9 ref. (N12, Cu, Fe)

234-N. (Book.) **Crystal Growth and Dislocations.** Ajit Ram Verma. 182 p, 1953. Butterworths Scientific Publications, Ltd., 4-6 Bell Yard, Temple Bar, London W.C.2, England. 30s.

A literature review supplemented by results of author's work on spiral growths, as examined by multiple-beam interferometry and phase-contrast microscopy. Methods and apparatus. (N12, M26)

P

Physical Properties and Test Methods

298-P. Electrical Resistivity of Dilute Binary Terminal Solid Solutions. Walter R. Hibbard, Jr. *Journal of Metals*, v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, May 1954, p. 594-602.

Published data used to establish theoretical relationships. Graphs, tables. 85 ref. (P15)

299-P. Photoconductivity in Gold-Germanium Alloys. Roger Newman. *Physical Review*, v. 94, ser. 2, Apr. 15, 1954, p. 278-285.

Results observed at 77 and 22° K in *n* and *p*-type gold-doped germanium. Interpretation of quenching data in terms of hole trap model. Graphs. 4 ref. (P15, Au, Ge)

300-P. Behavior of Ferromagnetic Domains Under Stress. G. Bonfiglioli, A. Ferro, G. Montalenti and G. Rosa. *Physical Review*, v. 94, ser. 2, Apr. 15, 1954, p. 316-318.

Analogy between effects of uniform magnetic field and static mechanical stress on motion of Weiss domains. Remanent strain and electrical resistivity variation reduced to zero by demagnetizing specimen. Graphs, diagram, table. 7 ref. (P16, Ni)

301-P. Electrical Properties of Pure Tellurium and Tellurium-Selenium Alloys. Allen Nussbaum. *Physical Review*, v. 94, ser. 2, Apr. 15, 1954, p. 337-342.

Resistivity and Hall coefficient of pure single crystals and six single crystal alloys, from 2.7 to 13.2% Se by wt. measured over range 90 to 550° K. Diagrams, table, graphs. 13 ref. (P15, Te, Se)

302-P. Effect of Hydrostatic Pressure on the Superconducting Transition of Tin and Thallium. Milan D. Fiske. *Physical Review*, v. 94, ser. 2, Apr. 15, 1954, p. 495-496.

Differences in threshhold fields of two single crystals measured. Pressure on one crystal held fixed while pressure on the other was varied by means of a tank of helium gas. Table. (P15, Sn, Th)

303-P. Resistivity Changes in Copper, Silver, and Gold Produced by Deuteron Irradiation Near 16° K. H. G. Cooper, J. S. Koehler and J. W.

Marx. *Physical Review*, v. 94, ser. 2, Apr. 15, 1954, p. 496.

Wires 99.97 ± 0.02% pure were irradiated with 12-mev. deuterons. Tables. 3 ref. (P15, Cu, Ag, Au)

304-P. The Magneto-Resistance Effect in Metals at High Frequencies. B. Donovan. *Physical Society, Proceedings*, v. 67, no. 412A, Apr. 1, 1954, p. 305-314.

Effect of magnetic field on surface impedance of a metal in which there are two overlapping bands of normal form. Graphs. 15 ref. (P16, Bi)

305-P. The Electrical Properties of Indium Antimonide at Low Temperatures. J. Hatton and B. V. Rollin. *Physical Society, Proceedings*, v. 67, no. 412A, Apr. 1, 1954, p. 385-386.

Resistivity, Hall coefficient and magneto resistance coefficients of semiconducting compound over temperature range 300 to 1° K. Graphs. 3 ref. (P15, In, Sb)

306-P. The Optical Constants of Tin Below the Superconducting Transition Temperature. N. G. McCrum and C. A. Shiffman. *Physical Society, Proceedings*, v. 67, no. 412A, Apr. 1, 1954, p. 386-388.

Direct optical determination at 5890° A. 11 ref. (P17, Sn)

307-P. Fundamental Properties of Semiconducting Materials. Esther M. Conwell. *Sylvania Technologist*, v. 7, Apr. 1954, p. 41-44.

Conduction electrons and holes, impurities and defects in germanium and silicon. Diagram. 29 ref. (P15, Ge, Si)

308-P. Magnetic Materials. Eberhard Both. Paper from "Materials for Product Development 1953". Clapp & Poliak, p. 199-221; disc., p. 221-222.

Properties of new materials and their applications. Magnetic properties explained. Photograph, graphs. 14 ref. (P16, SG-n)

309-P. (French.) **Gyromagnetic Relationships of Ferromagnetic Substances of the Fe-Co-Ni Group and Experimental Results of S. J. Barnett.** Sheldon Brown and André J. P. Meyer. *Comptes rendus*, v. 238, no. 14, Apr. 5, 1954, p. 1480-1482.

Includes graphs. 11 ref. (P16, Fe, Co, Ni)

317-P. (Russian.) **Anisotropic Hall Effect in Tin.** E. S. Borovik. *Doklady Akademii Nauk SSSR*, v. 95, no. 3, Mar. 21, 1954, p. 485-487.

Measurements at 4.22° K. with consideration of potential differences, resistance changes and magnetic field magnitudes. Graphs. 9 ref. (P15, Sn)

310-P. (German and French.) **Reflection and Radiation Power of Aluminum Foil and Sheets With Different Surfaces.** F. Rohner. *Aluminium Suisse*, v. 4, no. 2, Mar. 1954, p. 66-69.

Measurements for white light and ultraviolet rays. Radiation of pure aluminum and Peraluman-15 sheets 1.5 mm. thick with various surface treatments. Tables, diagrams. (P17, Al)

311-P. (Russian.) **Dependence of Coersive Forces of Soft Magnetic Materials on Thickness of the Sheet.** V. A. Zaikova and Ia. S. Shur. *Doklady Akademii Nauk SSSR*, v. 94, no. 4, Feb. 1, 1954, p. 663-665.

Comparison of materials differing by the value and sign of their anisotropic and magnetostriction constants. Graphs, table. 3 ref. (P16, Fe, Ni, Si)

312-P. (Russian.) **Magnetization Processes Conditioning the Phenomenon of Thermal Magnetic Hysteresis in Ferromagnetics.** N. A. Baranova and Ia. S. Shur. *Doklady Akademii Nauk SSSR*, v. 94, no. 5, Feb. 11, 1954, p. 825-827.

Study of long, thin nickel wires in temperature range from −195 to +20° C. in permanent magnetic fields up to 59 oersteds. Graphs. 4 ref. (P16, Ni)

313-P. (Russian.) **The Magnetic Field of Steady Currents Found in Cavities or Channels Inside Iron With Infinitely High Permeability.** G. A. Grinberg. *Doklady Akademii Nauk SSSR*, v. 94, no. 5, Feb. 11, 1954, p. 839-842.

New and interesting theorems. Series of contradictions, inaccuracies and errors present in literature. 2 ref. (P16, Fe)

314-P. (Russian.) **Effective Depth of Secondary Electron Emission.** N. D. Morgulis and N. G. Nakhodkin. *Doklady Akademii Nauk SSSR*, v. 94, no. 6, Feb. 21, 1954, p. 1029-1032.

Investigations on silver, copper, chromium, antimony, bismuth, titanium, indium, tellurium and germanium; and on copper, lead, indium, tin-cesium and antimony-cesium after pretreatment in a vacuum. Table, graphs, diagram. 20 ref. (P15)

315-P. (Russian.) **Study of Energy Levels of Aluminum and Boron Nuclei by Magnetic Analysis.** L. M. Khromchenko. *Doklady Akademii Nauk SSSR*, v. 94, no. 6, Feb. 21, 1954, p. 1037-1040.

Values for Al^{28} and B^{11}. Tables, graphs. 10 ref. (P12, Al, B)

316-P. (Russian.) **Theory of Measuring Magnetic and Dielectric Permeability of Semiconductors and Ferromagnets.** K. M. Polivanov. *Doklady Akademii Nauk SSSR*, v. 95, no. 1, Mar. 1, 1954, p. 61-64.

Method for determining parameters using only two tests. Diagrams. 6 ref. (P16)

318-P. (Russian.) **New Effect Caused by Gyromagnetic Phenomena.** K. M. Polivanov. *Doklady Akademii Nauk SSSR*, v. 95, no. 3, Mar. 21, 1954, p. 501-503.

Field on surface of a magneto-dielectric plate placed near one side of wave guide during passage of wave. Diagram. 8 ref. (P16)

319-P. (Russian.) **Anisotropy of Magnetic Properties of Powdered Mn-Bi Alloy.** E. V. Shtol'ts and Ia. S. Shur. *Doklady Akademii Nauk SSSR*, v. 95, no. 4, Apr. 1, 1954, p. 781-784.

Magnitude of coercive intensity, residual magnetization, particle dimensions and hystersis loop. Graphs, table. 4 ref. (P16, H11, Mn, Bi)

320-P. Heat Transfer to Lead-Bismuth and Mercury in Laminar and Transition Pipe Flow. H. A. Johnson, J. P. Hartnett and W. J. Clabaugh. *ASME, Transactions*, v. 76, May 1954, p. 513-517.

Experimental results in low Reynolds modulus range of 1000 to 10,000. Graphs. 25 ref. (P11, Pb, Hg)

321-P. Radiation in Metals. N. W. Snyder. *ASME, Transactions*, v. 76, May 1954, p. 541-548.

A resumé on electromagnetic theory of radiation in metals. Graphs. 42 ref. (P16)

322-P. The Magnetic and Electrical Properties of Cast Iron. M. H. Hillman. *British Cast Iron Research Association. Journal of Research and Development*, v. 5, Apr. 1954, p. 188-248 + 48 plates.

Varying combinations of graphite and matrix structure. Remanent magnetism, coercive force, hysteresis loss, maximum permeability, specific resistance, etc., determined for 24 specimens. Tables, diagrams, graphs, micrographs. 26 ref. (P16, P15, CI)

323-P. A Comparison of Chemical and Electrolytic Methods of Reduction. M. G. Fouad and J. F. Herringshaw. *Chemical Society, Journal*, 1954, Apr., p. 1207-1212.

Relation exists between reduction by dissolving metals and electrolytic reduction. Rate of former process predicted from electrolytic reduction data. Tables. (P13, Zn, Cd)

324-P. The Heats of Vaporization of the Elements. E. C. Baughan. *Faraday Society, Transactions*, v. 50, Apr. 1954, p. 322-335.

Predictions about heats of vaporization not yet known with precision. Anomalies are pointed out. Tables, graph. 43 ref. (P12)

325-P. The Domain Structure of Ferromagnetic Metals. L. F. Bates. *Institute of Metals, Journal*, v. 82, May 1954, p. 417-425 + 6 plates.

Powder-pattern technique permits mapping of intersections of domain boundaries with suitably prepared surfaces. Graphs, diagrams, micrographs, photograph. 12 ref. (P16, Fe)

326-P. Resistivity Anomalies in the Nickel-Chromium System as Evidence of Ordering Reactions. Rolf Nordheim and Nicholas J. Grant. *Institute of Metals, Journal*, v. 82, May 1954, p. 440-444.

During long-time annealing at temperatures below 500° C., the resistivity of alloys with more than 30 at. % chromium decreases markedly. Effect is associated with long-range ordering, possibly of the CuAu type. Graphs. 9 ref. (P15, N10, Ni, Cr)

327-P. Some Factors Affecting the Dimensional Stability of the Silver-Tin-(Copper-Zinc) Amalgams. J. A. Mitchell, I. C. Schoonover, George Dickson and H. C. Vacher. *Journal of Research, National Bureau of Standards*, v. 52, Apr. 1954, p. 185-193.

X-ray investigation shows free mercury present after initial solidification. It disappeared during period of greatest dimensional change. Tables, graphs, diagrams, X-ray diffraction charts. 9 ref. (P10, N12, Ag, Sn, Cu, Zn)

328-P. A Cryoscopic Study of the Solubility of Uranium in Liquid Sodium at 97.8° C. Thomas B. Douglas. *Journal of Research, National Bureau of Standards*, v. 52, May 1954, p. 223-226.

Impurities lowered freezing points by approximately 0.035° C. Sodium containing finely divided uranium was found to have a freezing point higher by 0.005° C. Graph, table, diagram. 1 ref. (P12, U, Na)

329-P. Compressibilities of Crystalline and Glassy Modifications of Selenium and Glucose. Charles E. Weir. *Journal of Research, National Bureau of Standards*, v. 52, May 1954, p. 247-249.

Compressibilities of glassy form were larger than for crystalline. Graphs, table. 11 ref. (P10, Se)

330-P. On the Theory of Magnetic Susceptibility of Thin Layers of Metals at Low Temperatures. I. M. Lifshits and A. M. Kosevich. *National Science Foundation Translation, no.* 156, Jan. 1954, 5 p. (From *Doklady Akademii Nauk SSSR*, v. 91, 1953, p. 795-798.)

Previously abstracted from original. See item 42-P, 1954. (P16)

331-P. Latent Heat of Transition of Superconducting Lead. R. L. Dolecek. *Physical Review*, v. 94, ser. 2, May 1, 1954, p. 540-543.

Utilizing magnetic heating, calorimetric measurements of lead were obtained in range 2.5 to 7.0° K. Graphs, table, diagrams. 8 ref. (P12, Pb)

332-P. Resistance Anomalies in Some Rare-Earth Metals. R. J. Elliott. *Physical Review,* v. 94, ser. 2, May 1, 1954, p. 564-568.

Anomalies observed in lighter metals explained by simple model of interaction between conduction electrons and *f* electrons tightly bound to each atom. Graphs. 13 ref. (P15, Ce, Pr, Nd)

333-P. Hall Mobility of Electrons and Holes in Silicon. P. P. Debye and T. Kohane. *Physical Review,* v. 94, ser. 2, May 1, 1954, p. 724-725.

Includes graphs. (P15, Si)

334-P. (German.) **The Heating of Tensile Bars Due to Plastic Deformation.** Paul Täubert. *Zeitschrift für angewandte Physik,* v. 6, no. 3, Mar. 1954, p. 108-112.

Thermal conduction and heat transfer to surrounding areas. Influence of temperature on strength properties of a metal. Graphs. 2 ref. (P11, Q24, Q23)

335-P. (German.) **Ultra-Optical Properties of Metals and Average Free Path Length of the Conduction Electrons.** Joachim Euler. *Zeitschrift für Physik,* v. 137, no. 3, Apr. 14, 1954, p. 318-332.

Measurements on 52 layers of gold with infrared light show that relationship between conductivity and optical properties is inadequately explained. Graphs, micrographs, diagram. 23 ref. (P17, P15, Au)

336-P. (French.) **Surface Magnetic Anisotropy and Orientation Superstructures.** Louis Néel. *Journal de physique et le radium,* v. 15, no. 4, Apr. 1954, p. 225-239.

Spontaneous magnetization and mechanical deformations of permanent magnet alloys. Graph. 19 ref. (P16, Q general, SG-n)

337-P. (Russian.) **Investigation of Field Emission of Nickel.** G. V. Spivak and A. Gel'berg. *Doklady Akademii Nauk SSSR,* v. 94, no. 3, Jan. 21, 1954, p. 455-458.

Effect of hydrogen. Variation during passage through Curie point. Micrograph, graph. 11 ref. (P16, Ni)

338-P. (Russian.) **Physics of Thin Metallic and Semiconductive Layers.** I. D. Konozenko. *Uspekhi Fizicheskikh Nauk,* v. 52, no. 4, Apr. 1954, p. 561-602.

Influence of structure on electrical and physical properties. Tables, graphs, micrographs. 99 ref. (P15)

339-P. (Russian.) **Inhibiting Influence of Gaseous Reaction Products on the Velocity of Reduction of Iron Oxides by Hydrogen and Carbon Monoxide.** G. I. Chufarov, B. D. Averbukh, E. P. Tatievskaia and V. K. Antonov. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 3, Mar. 1954, p. 490-497.

Experiments show good accord with data on adsorption of reducing gases and reduction products. Graphs. 7 ref. (P12, Fe)

340-P. Electrochemical Polarization of Titanium in Aqueous Solutions of Sodium Chloride. Norman Hackerman and Colby D. Hall, Jr. *Electrochemical Society, Journal,* v. 101, June 1954, p. 321-327.

Cathodic and anodic curves for titanium in neutral sodium chloride solutions determined over range 0.02 microamp. per sq.cm. to 0.01 amp. per sq.cm. Graphs, tables. 8 ref. (P15, Ti)

341-P. Heat Transfer to Aluminum. II. Kirtland Marsh. *Industrial Heating,* v. 21, May 1954, p. 898 + 6 pages.

Emissivity factor, based on experimental conditions, is considered to show effect of radiation alone on rate of heat transfer. Photograph, tables, graphs. (To be continued.) (P11, P17, Al)

342-P. Growth Characteristics of Ingot-Mould Irons in Air and Vacuum. J. W. Grant. *Institute of British Foundrymen, Proceedings,* v. 46, 1953, p. A110-A128; disc., p. A128-A130.

Continued growth with repeated heating in vacuum was arrested by annealing at 700° C. in air. Graphs, photographs micrographs, tables. 24 ref. (P10, J23, CI)

343-P. Measurement of the Effect of Chlorine Treatment on the Work Function of Titanium and Zirconium. Herbert Malamud and Aaron D. Krumbein. *Journal of Applied Physics,* v. 25, May 1954, p. 591-592.

Photo-electric method used to find suitability of metals as counter cathode materials. Table, diagram. 4 ref. (P15, Zr, Ti)

344-P. Silicon Monoxide Reactions in Steelmaking. (Digest of "Thermodynamic Properties of Silicon Monoxide", by N. C. Tombs and A. J. E. Welch; *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 69-78.) *Metal Progress.* v. 65, June 1954, p. 188 + 3 pages.

Three methods for determining amount of silicon monoxide produced from mixtures of silicon and silica, or hydrogen and silica, from 2370 to 3000° F. (P12, D general, ST)

345-P. Anomalous Electron-Scattering in Metals. D. K. C. MacDonald and W. B. Pearson. *Philosophical Magazine,* v. 45, 7th ser., no. 364, May 1954, p. 491-496.

Consequences of semitheoretical equation which accounts qualitatively for thermo-electric power of metals and alloys at low temperatures. Graphs. 9 ref. (P15)

346-P. Magnetic Viscosity in Precipitation Alloys: FeNiAl, Fe_2NiAl and Alnico. J. H. Phillips, R. Street and J. C. Woolley. *Philosophical Magazine,* v. 45, 7th ser., no. 364, May 1954, p. 505-523.

Investigations on effects of various heat treatments. Graphs. 14 ref. (P16, Fe, Ni, Al, SG-n)

347-P. The Magnetic Susceptibility of the Transition Elements. C. J. Kriessman and Herbert B. Callen. *Physical Review,* v. 94, ser. 2, May 15, 1954, p. 837-844.

Empirical data on temperature coefficient of susceptibility, absolute magnitude of susceptibility and specific heats analyzed to suggest probable alterations in available theoretical density-of-states curves. Graphs, tables. 24 ref. (P16)

348-P. Electrical Properties of Single Crystals and Thin Films of PbSe and PbTe. S. J. Silverman and H. Levinstein. *Physical Review,* v. 94, ser. 2, May 15, 1954, p. 871-876.

Measurements involve Hall constant and resistivity from which mobility, number and kind of carriers are determined. Graphs, tables. diagrams. 12 ref. (P15, Pb, Se, Te)

349-P. Properties of Plutonium Metal. Cyril Stanley Smith. *Physical Review,* v. 94, ser. 2, May 15, 1954, p. 1068-1069.

Structure and physical properties as declassified by AEC. Table, graphs. (P general, M27, Pu)

350-P. (English.) **The Ferromagnetic Anisotropy of the Specific Resistance of Some Nickel Alloys.** H. C. Van Elst and C. J. Gorter. *Applied Scientific Research,* v. 4, sec. B, nos. 1-2, 1954, p. 87-90.

Results of work on 24 nickel alloys at temperatures of 14, 20, 64, 77 and 273° K. Table. 2 ref. (P16, Ni)

351-P. (English.) **The Effect of Cold-Work on the Electrical Resistivity of Alloys and the Law of Recovery.** J. O. Linde. *Applied Scientific Research,* v. 4, sec. B, nos. 1-2, 1954, p. 73-86.

Change in resistivity due to cold work for a number of binary alloy series having copper, silver or gold as basic metal. Tables, graphs. 17 ref. (P15, Q24, Cu, Au, Ag)

352-P. (Dutch.) **Copper and Copper Alloys. XIII. Brass.** W. G. R. De Jager. *Metalen,* v. 9, no. 7, Apr. 15, 1954, p. 112-115.

Physical, electrical and thermal properties of alloys containing up to 40% zinc. Tables, graphs. (To be continued.) (P general, Q general, Cu, Zn)

353-P. (French.) **The Theory of Magnetic Properties of Solid Substances.** Louis Néel. *Applied Scientific Research,* v. 4, sec. B, nos. 1-2, 1954, p. 13-24.

Improvements in theory of magnetic hysteresis of fine grains. Table, graph. 9 ref. (P16)

354-P. (German.) **Magnetic Behavior and Filling of Bands in the Aluminum-Manganese and the Silver-Lead Series.** E. Vogt. *Applied Scientific Research,* v. 4, sec. B, nos. 1-2, 1954, p. 34-42.

Determination of passing of electrons from transitional elements into the band. Table, graphs. 20 ref. (P16, Al, Mn, Ag, Pb)

355-P. (Book.) **Electrochemical Constants.** N.B.S. Circular 524. Proceedings of the National Bureau of Standards Semicentennial Symposium on Electrochemical Constants, Sept. 1951. 310 p. 1953. National Bureau of Standards, Washington, D. C. $2.00.

Contains 30 papers by 42 authorities. Experimental and theoretical developments in field of fundamental electrochemistry from leading establishments in U. S. and abroad. (P15)

Q

Mechanical Properties and Test Methods; Deformation

517-Q. The Torsion of Solid Regular Hexagonal Shaft by Relaxation Methods. B. V. Saroja. *Indian Institute of Science, Journal,* v. 36, sec. B, Apr. 1954, p. 37-42.

Mathematical determination of stress function in prismatic bar with uniform cross section. Diagrams. 3 ref. (Q1)

518-Q. Isothermal Temper Embrittlement and the Effect of Hardness on Transition Temperature. B. C. Woodfine. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 532-533.

Changes in transition temperature taking place on tempering a low-alloy steel above 650° C. can be explained by normal processes of tempering and are not result of abnormal embrittling change. Graph. 11 ref. (Q23, J29)

519-Q. Mechanical Properties of Beryllium Fabricated by Powder Metallurgy. W. W. Beaver and K. G. Wikle. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 559-573.

General survey of mechanical properties of commercially pure beryllium fabricated from powder by vacuum hot pressing and other consolidation methods. Effect of fabrication method, grain size, strain rate and directionality upon both room and elevated tempera-

ture tensile properties. Tables, diagrams, photographs, graphs. 12 ref. (Q general, H general, Be)

520-Q. Mechanical Properties of Beryllium Copper at Subzero Temperatures. J. T. Richards and R. M. Brick. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 574-580.

Experimental data on beryllium-copper, beryllium-cobalt-copper and beryllium-zinc-copper in wrought and cast conditions. Influence of cold work and age hardening treatment upon subzero behavior. Effects of temperature upon both elastic and plastic deformation. Graphs, tables. 11 ref.
(Q21, Q23, Be, Cu, Co, Zn)

521-Q. 475° C (885° F) Embrittlement in Stainless Steels. A. J. Lena and M. F. Hawkes. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 607-615.

Changes in hardness, tensile properties, microstructure, electrical resistance and X-ray diffraction effects indicate lattice strains are necessary for embrittlement of ferritic stainless steels when heated for relatively short times at 475° C. Graphs, tables, micrographs, radiograms. 24 ref. (Q23, SS)

522-Q. Mechanism of Ortho Kink-Band Formation in Compressed Zinc Monocrystals. J. J. Gilman. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 621-629.

Dependence of ortho kink-band formation on crystal orientation, temperature and conditions at ends of specimen. Photographs, diagrams, graphs, micrographs. 13 ref. (Q24, Zn)

523-Q. Creep Behavior of Magnesium-Cerium Alloys. C. S. Roberts. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 634-640.

Photographic study of microstructural changes between 300 to 600° F. shows outstanding creep resistance results primarily from potent precipitation hardening locally at grain boundaries. Tables, graphs, micrographs. 17 ref. (Q3, Mg, Ce)

524-Q. The Influence of Carbon and Manganese on the Properties of Semi-killed Hot Rolled Steel. F. W. Boulger and R. H. Frazier. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 645-652.

Effects on grain size and tensile and notched bar properties. Tables, graphs, diagrams, micrographs. 13 ref. (Q23, M27, AY)

525-Q. Impact Transition Temperatures of Some Pearlite-Free Mild Steels as Affected by Heat Treatments in the Alpha Range. Ake Josefsson. *Journal of Metals,* v. 6, May 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, May 1954, p. 652-659.

Transition temperatures of 0.01 to 0.02% carbon steels shown to be strongly influenced by cooling rate in alpha range, quenching from the lower critical point causing very low transition temperature even after strain aging. Tables, graphs, micrographs. 13 ref. (Q6, CN)

526-Q. Introduction to Directionality in Copper. (Digest of "Directionality in Rolled Copper and Brass", by G. L. J. Bailey, *Sheet Metal Industries,* v. 30, Aug. 1953) *Metal Progress,* v. 65, May 1954, p. 190, 192.

Previously abstracted from original. See item 825-Q, 1953. (Q24, Cu)

527-Q. Relation Between Vickers Microhardness and Macrohardness. R. Schulze. *Microtecnic (English Ed.),* v. 8, no. 1, 1954, p. 13-26. (Translated from the German.)

Elastic recovery of indentation can be ignored in macro but not in microhardness range. Formula for correlation. Graphs, micrographs, diagrams. 12 ref. (Q29)

528-Q. Installation Torque vs. Stress in Standard AN Bolts. *Product Engineering,* v. 25, May 1954, p. 158-160.

Evaluation of tests to determine correct torque to produce expected bolt stress. Tables, graphs, diagram. 4 ref. (Q1)

529-Q. Endurance Strength. Nitriding vs. Shot-Peening. *Tooling and Producion,* v. 20, May 1954, p. 52-54.

Fatigue-life relationship between nitriding and shot peening on an automotive-type crankshaft. Tables, graph, photograph.
(Q7, J28, G23, CN, AY)

530-Q. Brinell Hardness Numbers for Various Loads. *Welding Engineer,* v. 39, May 1954, p. 71.

Data sheet for loads ranging from 500 to 3000 kg. (Q29)

531-Q. Materials for Low-Temperature Service. Francis B. Foley. Paper from "Materials for Product Development 1953". Clapp & Poliak, p. 144-159; disc., p. 159-161.

Various aspects of selection, design and testing of metals for service down to −328° F. Diagrams, graphs, tables. (Q general)

532-Q. (German.) **A Contribution to the Theory of Orthotropic Plates.** Witold Nowacki. *Acta Technica Academiae Scientiarum Hungaricae,* v. 8, nos. 1-2, 1954, p. 109-128.

Greenian function derived where close form is used instead of infinite series. Diagrams, graphs. (Q25)

533-Q. (Hungarian.) **Manganese-Titanium Carburized Economy Steels.** Nandor Hajto. *Kohaszati Lapok,* v. 9, no. 2, Feb. 1954, p. 59-68.

Effect of titanium on various steels made with Hungarian alloying elements. Mechanical properties of various specimens. Results of case hardening. Tables, graphs. 10 ref. (Q general, J28, AY)

534-Q. (Polish.) **Formation of Cracks in Rails.** Jozef Gorecki. *Hutnik,* v. 21, no. 2, Feb. 1954, p. 35-40.

Causes of breaks, open and hairline cracks and tangential stresses in the rail head. Diagrams, micrographs, photographs, graph table. 1 ref. (Q26 CN)

535-Q. (Russian.) **Nature of Fracture During Plastic Deformation of Metals.** S. I. Gubkin and L. A. Rapoport. *Doklady Akademii Nauk SSSR,* v. 94, no. 4, Feb. 1, 1954, p. 685-688.

Formation of tensile stress, structural changes induced by recrystallization and formation of new phases. Micrographs. 4 ref.
(Q24, N5)

536-Q. (Russian.) **Hardness of Gamma-Solid Solutions in the System Iron-Carbon at High Temperatures.** K. A. Osipov and E. M. Miroshkina. *Doklady Akademii Nauk SSSR,* v. 94, no. 6, Feb. 21, 1954, p. 1065-1067.

Investigation on Armco iron and iron with 0.36 to 1.04% carbon, 0.13 to 0.20% silicon and 0.20 to 0.33% manganese at temperatures between 910 and 1100° C. Table, graphs. 5 ref. (Q29, Fe)

537-Q. (Russian.) **Creep of Tin Monocrystals.** E. P. Zakoshchikova. *Doklady Akademii Nauk SSSR,* v. 95, no. 3, Mar. 21, 1954, p. 575-577.

Plastic flow at stresses lower than creep limit. Influences of surface active substances. Graphs. 5 ref. (Q3, Sn)

538-Q. (Russian.) **Precision of Engine-Wear Investigation by the Method of Radioactive Tracers.** Iu. S. Zaslavskii, G. I. Shor and F. B. Lebedeva. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 1, Jan. 1, p. 54-60.

Simultaneous investigation on single-cylinder engine by radioactive tracers, weighing the piston ring, alveolar deposition on the piston ring and plotting of a wear diagram on the basis of the amount of iron in the lubricating oil. Graphs, tables, diagrams. 4 ref. (Q9)

539-Q. (Russian.) **Deformability of Pressure-Worked Bronzes.** S. I. Gubkin and Iu. A. Tsvaigel. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 1, Jan. 1, p. 128-137.

Investigation of aluminum-iron, beryllium and tin-phosphorus bronzes at temperatures of 20 to 900° C. Tables, graphs. 1 ref.
(Q24, Cu)

540-Q. (Swedish.) **High-Temperature Yield Point of Welded Stainless Steels.** Tore Norén and Bengt Ramshage. *Svetsaren,* v. 18, no. 4, 1953, p. 47-48.

Chromium, Cr-Ni, Cr-Ni-V and Cr-Ni-Mo steels tested at temperatures up to 400° C. Tables, graphs. (Q27, K general, SS)

541-Q. Tests on Magnesium-Zirconium Alloy Castings. *Aircraft Engineering,* v. 26, May 1954, p. 162-163, 167.

Porosity and strength checked by static pressure pulsation tests. Tables, diagrams. (Q23, Mg, Zr)

542-Q. Measurement of Stresses Imposed on Wheels in Diesel-Locomotive Service. L. L. Olson. *ASME, Transactions,* v. 76, May 1954, p. 613-616.

Objectives, test procedures and instrumentation of proposed program to determine causes of wheel failures. Photographs, diagrams.
(Q25, ST)

543-Q. A Concept of Fatigue Damage. S. M. Marco and W. L. Starkey. *ASME, Transactions,* v. 76, May 1954, p. 627-632.

Stepwise varying stress sequences applied to rotating cantilever-beam specimens. Typical curves of fatigue damage versus cycle ratio were deduced. Graphs, micrographs, tables. (Q7, Al, AY)

544-Q. Thermal-Shocking Austenitic Stainless Steels With Molten Metals. R. A. Tidball and M. M. Shrut. *ASME, Transactions,* v. 76, May 1954, p. 639-643.

Specimens of AISI 347 pipe and pipe welds were subjected to repeated thermal shocks by quenching inner surface with cool sodium-potassium alloy. Equipment used and method of measuring transient fluid and wall temperatures. Diagrams, graphs. (Q25)

546-Q. Thermal Checking of Wrought-Steel Railway Wheel Material. H. R. Wetenkamp. *ASME, Transactions,* v. 76, May 1954, p. 649-654.

Mechanism of formation of small cracks formed as result of two heat cycles. Table, photographs, graphs. 5 ref. (Q26, ST)

547-Q. Temper Embrittlement in Blackheart Malleable and Nodular Cast Irons. G. N. J. Gilbert. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Apr. 1954, p. 249-263 + 4 plates.

Ferritic and blackheart irons with high silicon and phosphorus contents, previously slowly cooled from

690° C., become embrittled when heated for short times in range from 400 to 600° C. and quenched. Molybdenum decreases degree of embrittlement due to treatment at 450° C., both in irons quenched and slowly cooled from 650° C. Photographs, micrographs, graphs, tables. 11 ref. (Q23, CI)

548-Q. Better Submarine Hull Is Goal of Model Basin Work. R. E. Stark. *Bureau of Ships Journal,* v. 3, May 1954, p. 20-24.

Theoretical analyses of structural problems inherent in submarine design. Photographs, diagrams. (Q general, T21)

549-Q. Properties of Titanium Bolts. R. A. Baughman. *Tool Engineer,* v. 32, June 1954, p. 84.

Tensile, torque-tensile, galling and relaxation tests made to determine use on gas turbines. Graph, table. (Q23, Q1, Q9, Q3, Ti)

550-Q. Some Further Observations on the Fatigue Process in Pure Aluminium. P. J. E. Forsyth. *Institute of Metals, Journal,* v. 82, May 1954, p. 449-455 + 3 plates.

Similarities and differences of deformation produced by cyclic and static stressing investigated microscopically and by multiple-beam interference technique. Micrographs, photograph. 6 ref. (Q7, Al)

551-Q. A Theory of Hydrogen Embrittlement. F. de Kazinczy. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 85-92.

Relation between hydrogen content and strength and ductility of steel. Graphs. 21 ref. (Q23, ST)

552-Q. Tensile and Impact Properties of Fe-Si, Fe-Ni, Fe-Cr, and Fe-Mo Alloys of High Purity. W. P. Rees, B. E. Hopkins and H. R. Tipler. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 93-110 + 1 plate.

Tough-to-brittle transition at various temperatures. Micrographs, graphs, tables. 15 ref. (Q23, Q6, Fe, Si, Ni, Cr, Mo)

553-Q. Effect of Heat-Treatment on the Brittleness of High-Purity Iron-Nitrogen Alloys. B. E. Hopkins and H. R. Tipler. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 110-117 + 1 plate.

Tensile and notch impact tests on two alloys in tough-to-brittle transition. Tables, graphs. 13 ref. (Q23, Q6, Fe)

554-Q. Practical Aspects of Hardness Testing of Steel Strip. G. Molinder. *Iron and Steel Institute, Journal,* v. 177, May 1954, p. 159-164.

Applicability of some generally accepted methods on hardened cold rolled strip. Diagram, graphs, tables. 4 ref. (Q29, ST)

555-Q. Postbuckling Behavior of Axially Compressed Circular Cylindrical Shells. Joseph Kempner. *Journal of the Aeronautical Sciences,* v. 21, May 1954, p. 329-335, 342.

Mathematical analysis of applied stresses. Graphs. 10 ref. (Q25)

556-Q. Large Elastic Deformations of Homogeneous Anisotropic Materials. J. L. Ericksen and R. S. Rivlin. *Journal of Rational Mechanics and Analysis,* v. 3, May 1954, p. 281-301.

Problem for materials possessing transverse isotropy mathematically solved. 11 ref. (Q21)

557-Q. Determination of the Plastic Yield Condition as a Variational Problem. T. Y. Thomas. *National Academy of Sciences of the United States of America, Proceedings,* v. 40, May 1954, p. 322-331.

Mathematical analysis of condition that plastic flow occurs in such a way as to minimize a certain energy integral taken over region of flow. (Q23)

558-Q. Study of a Deformed State by Radioactive Isotopees. S. I. Gubkin and S. A. Dovnar. *National Science Foundation Translation, no.* 145, Dec. 1953, 2 p. (From *Doklady Akademii Nauk SSSR,* v. 91, 1953, p. 1089-1090.)

Previously abstracted from original. See item 95-Q, 1954. (Q24, S19)

559-Q. Relation Between Creep and Relaxation of Stresses in Metals. I. A. Oding, O. V. Sorokin and N. D. Sazanova. *National Science Foundation Translation, no.* 152, Dec. 1953, 4 p. (From *Doklady Akademii Nauk SSSR,* v. 92, 1953, p. 565-568.)

Previously abstracted from original. See item 321-Q, 1954. (Q3, SS)

560-Q. A New Technique for Investigating Surface Flow in Metal-Working Processes. J. M. Capus and M. G. Cockcroft. *Nature,* v. 173, May 1, 1954, p. 821.

Surface scratches provide valuable means of investigating topography of surface flow during deformation. Micrograph. 1 ref. (Q24)

561-Q. The Economics of Tank Failures. F. A. Gitzendanner. *Petroleum Refiner,* v. 33, May 1954, p. 160-162.

Failures, about 32 per 110,000 tank-yr. service, are generally brittle-type. Some can be avoided. Tables. 2 ref. (Q23, CN)

562-Q. Lattice Imperfections and Plastic Deformation in Metals. I. Nature and Characteristics of Lattice Imperfections, Notably Dislocations. H. G. van Bueren. *Philips Technical Review,* v. 15, Feb.-Mar. 1954, p. 246-257.

Geometrical aspects and behavior under shear stress. Micrographs, diagrams. 15 ref. (Q24, M26)

563-Q. A Method for Determining the "Safe" Life of an Aircraft Wing From Fatigue Test Results. A. P. Kennedy. *Royal Aeronautical Society, Journal,* v. 58, May 1954, p. 361-366.

Basis of method is assumption that fatigue test results can be represented by a log-normal distribution. Statistical methods employed to determine probability of a wing boom being capable of withstanding a particular number of reversals to failure. Graphs, tables. 4 ref. (Q7)

564-Q. Some Notes on the Torsion-Bending Constant. J. Solvey. *Royal Aeronautical Society, Journal,* v. 58, May 1954, p. 367-370.

Important in calculation of buckling loads under compression of struts failing in torsional or torsional-flexural mode. (Q1, Q5)

565-Q. The Influence of Oxide and Lubricant Films on the Friction and Surface Damage of Metals. W. Hirst and J. K. Lancaster. *Royal Society, Proceedings,* v. 223, ser. A, May 6, 1954, p. 324-338 + 1 plate.

Differences in protection given by different oxide films on same metal were noticeable in presence of lubricant. Oxide film with poor protective properties can completely inhibit potential protective action of lubricant. Micrographs, graphs, tables. 18 ref. (Q9)

566-Q. The Elastic Deformations of a Plate Near a Hole With a Stiffening Rim. R. B. Harvey. *Royal Society, Proceedings,* v. 223, ser. A, May 6, 1954, p. 338-348.

Solution of equations of generalized plane stress obtained for plate under tension when a rim of material of different thickness is between two bounding curves. 8 ref. (Q21)

567-Q. The Formation of Cracks as a Result of Plastic Flow. A. N. Stroh. *Royal Society, Proceedings,* v. 223, ser. A, May 6, 1954, p. 404-414.

Stresses around a piled-up group of dislocations investigated with reference to initiation of a crack. A crack should form when group consists of about 1000 dislocations in a cold-worked metal. 14 ref. (Q24)

568-Q. How Processing Introduces Residual Stresses. R. L. Mattson. *SAE Journal,* v. 62, May 1954, p. 58-59.

Abridged from "Effects of Residual Stress on Fatigue Life of Metals" presented at SAE Annual Meeting, Detroit, Jan. 1954. Summary for designers and production men. Table. (Q25, Q7)

569-Q. Experiences With the Double-Cone Indenter. P. Grodzinski. *Sheet Metal Industries,* v. 31, no. 325, May 1954, p. 383-390.

Stresses need for new form of hardness indenter. Basic advantages not given by other equipment presented and proven. Photographs, diagrams, graphs, micrographs. (Q29)

570-Q. The Mechanics of Stress and Strain Occurring in a Fourdrinier Wire. John D. Lyall. *Tappi,* v. 37, May 1954, p. 207-214; disc., p. 215-216.

Method calculates tensile and bending stresses induced in a single wire, at various positions around the fourdrinier. Graphs, diagrams, photographs, tables. 9 ref. (Q23, Q5)

571-Q. Increase Tap-Drill Diameters and Save Money. M. L. Begeman and C. C. Chervenka. *Tool Engineer,* v. 32, June 1954, p. 61-65.

Tests to determine optimum relationship existing between strength of threaded connections and tapping expense. Photographs, diagram, graphs, table. (Q23, G17)

572-Q. Directionality of Mechanical Properties in Hot-Worked Steels. A. R. Troiano and L. J. Klingler. *Welding Journal,* v. 33, May 1954, p. 209S-217S.

Extent to which directionality is influenced by processing variables. Graphs. 29 ref. (Q24, ST)

573-Q. High-Pressure Vessels Subjected to Static and Dynamic Loads. E. D. Narduzzi and Georges Welter. *Welding Journal,* v. 33, May 1954, p. 230S-238S.

Elastic stress-strain relations for external and internal walls for cylindrical shells subjected to internal pressure. Comparison of actual to theoretical stresses. Application of various theories of fracture. Suggestions for design formulas. Tables, graphs, diagrams, photographs. 7 ref. (Q21, Q26)

574-Q. Stresses for Pressure Vessels and Boilers Up to 650° F. W. P. Kerkhof. *Welding Journal,* v. 33, May 1954, p. 239S-251S.

Calculation and rupture theory for vessels subjected to internal pressure. Tables, diagrams. (Q25)

575-Q. (Czech.) Steel Properties for Cast Kalpan Turbine Blades. Alexander Nemes. *Slévarenství,* v. 2, no. 1, Jan. 1954, p. 2-9.

Advantages, limitations, chemical analysis and mechanical properties of various types of steel. Tables, graphs. 3 ref. (Q general, T25, AY, SS)

576-Q. (Czech.) Cracks in Gear Wheel Castings. Josef Pribyl. *Slévarenství,* v. 2, no. 1, Jan. 1954, p. 17-22.

Disadvantages of rigid construction and influence of thermal conductivity of material. Diagrams. 4 ref. (Q26, P11, CI)

577-Q. (French.) Measurement of Photo-Elastic Stresses. Roger Fleury and Félix Zandman. *Comptes rendus,* v. 238, no. 15, Apr. 12, 1954, p. 1559-1561.

Use of plastic photo-elastic material permits direct outlining of stresses on surfaces. Graph. (Q25)

578-Q. (French.) **Relation Between Fibrous Structure and Deformation Mechanism in Machined Chips as Determined by X-Rays.** Paul Bastien and Michel Weisz. *Comptes rendus,* v. 238, no. 15, Apr. 12, 1954, p. 1583-1585.

Formula offers solution of plastic flow problems on carbon, sulfur and chromium-molybdenum steels and aluminum alloys. Diagrams. 9 ref. (Q24, G17, CN, AY, Al)

579-Q. (French.) **Effect of Ultrasound on Temper of Metals.** J. Palmé. *Métaux, Corrosion-Industries,* v. 29, no. 343, Mar. 1954, p. 100-104.

Steel and duralumin specimens tested for hardness and aging. Tables, micrographs, graphs. (Q29, N7, ST, Al)

580-Q. (French.) **Experimental Measurement of Torsion Vibrations. The Triangle Diagram.** Roger Fleury. *Métaux, Corrosion-Industries,* v. 29, no. 343, Mar. 1954, p. 105-110.

Method records vibrations of shaft or axle torsion. Photographs, graphs, diagrams. (Q9, Q1)

581-Q. (French.) **Contribution to the Study of the Modulus of Elasticity of Metal Alloys.** René Le Roux. *Métaux, Corrosion-Industries,* v. 29, no. 343, Mar. 1954, p. 111-132.

Thermo-elastic study and isothermal decomposition of eutectoid of aluminum bronzes. Tables, graphs, micrographs, diagram. 26 ref. (Q21, Cu)

582-Q. (French.) **Plastification of Soft Steel Plate-Web Girders.** A. Lazard. *Ossature metallique,* v. 19, no. 5, May 1954, p. 274-284.

Fatigue properties of iso and hyperstatic girders. Graphs, diagrams, table. (Q7, ST)

583-Q. (French.) **Improving the Stability of Resistance Strain Gages Subjected to Alternating Forces.** Georges Vidal, Jean Laxague and Pierre Lanusse. *Recherche Aéronautique,* 1954, no. 38, Mar.-Apr., p. 53-56.

Tests on steel and aluminum alloys. Diagrams, tables, photograph, micrograph. (Q25, ST, Al)

584-Q. (German.) **The Extended Evaluation of Diagrams of Chévenard Microtensile Testing Machine.** H. Hendus and H. Rohrig. *Metall,* v. 8, nos. 9-10, May 1954, p. 371-373.

Advantages in research, production control and computation of different functions. Diagrams, graphs, photograph. 5 ref. (Q27)

585-Q. (German.) **Tendency of Local Change in Solution Pressure of Metals Under Slight Stresses.** Paul Koch. *Metalloberfläche,* Ausgabe A, v. 8, no. 5, May 1954, p. 74-79.

Experimental and mathematical studies indicate that slip is probable cause. Graphs, diagram, tables. 21 ref. (Q25, P12, Cu, Al, Fe, Zn, Pt, Ag)

586-Q. (Russian.) **Influence of Surface Geometry and External Medium on Cold Shortness of Steel.** E. M. Shevandin, I. A. Razov and R. E. Reshetnikova. *Doklady Akademii Nauk SSSR,* v. 94, no. 3, Jan. 21, 1954, p. 463-466.

Tests evaluate influence of surface geometry on strength and plasticity of steel under static tensile and bending stresses. Graph. 3 ref. (Q23, ST)

587-Q. (Russian.) **Mechanism of Weakening and Rupture of Crystalline Bodies as a Function of Time at High Temperature.** S. T. Kishkin. *Doklady Akademii Nauk SSSR,* v. 95, no. 4, Apr. 1, 1954, p. 789-791.

Decrease of strength, formation of cracks, strengthening and weakening of nickel and iron alloys. Graphs. 5 ref. (Q26, Ni, Fe)

588-Q. (Russian.) **Damage to Metals Under Prolonged Loads at High Temperatures** Ia. B. Fridman and B. A. Drozdovskii. *Doklady Akademii Nauk SSSR,* v. 95, no. 4, Apr. 1, 1954 p. 793-796.

Damagability curve for chromium-nickel alloy at 600° C. Graph, micrographs. 10 ref. (Q general, Cr, Ni)

589-Q. Plastic Deformation in Beams Under Distributed Dynamic Loads. J. A. Seiler and P. S. Symonds. *Journal of Applied Physics,* v. 25, May 1954, p. 556-563.

Magnitude of deformation decreases rapidly as length of loaded area increases from zero. Assumption of concentrated load may lead to overestimation of deformation. Graphs, diagrams. 6 ref. (Q24)

590-Q. Friction of Clean Metals and Oxides With Special Reference to Titanium. E. S. Machlin and W. R. Yankee. *Journal of Applied Physics,* v. 25, May 1954, p. 576-581.

Friction coefficients of freshly cut surfaces in inert atmosphere compared with values on same surfaces later exposed to air to determine factors that affect seizure and galling. Photographs, tables. 5 ref. (Q9, Ti)

591-Q. Delayed Yield and Strain Rate and Temperature Dependence of Yield Point in Iron. Takeo Yokobori. *Journal of Applied Physics,* v. 25, May 1954, p. 593-594.

Cottrell locking theory used, taking internal stress into account. Graphs, table. 13 ref. (Q23, Fe)

592-Q. An Effect Produced by Oblique Impact of a Cylinder on a Thin Target. William A. Allen, Joe M. Mapes and Wesley G. Wilson. *Journal of Applied Physics,* v. 25, May 1954, p. 675-676.

Right circular steel cylinders were fired at conventional ordnance velocities into thin plane lead targets. Micrographs. 2 ref. (Q6, Pb, ST)

593-Q. Fatigue Notch Sensitivity of Some Aluminum Alloys. J. A. Bennett and J. G. Weinberg. *Journal of Research, National Bureau of Standards,* v. 52, May 1954, p. 235-245.

Values determined for 24S-T4, 61S T6 and 76S-T6. Specimens had theoretical stress-concentration factors of 1.0, 1.4 and 1.8. Tables, graphs, micrographs, photographs. 14 ref. (Q7, Al)

594-Q. Report of Symposium on Wear and Abrasion. (Digest of "Proceedings of the International Symposium on Abrasion and Wear", *Engineering,* v. 172, Aug. 24, 1951, p. 243; Nov. 30, 1951, p. 694; Dec. 7, 1951, p. 724; Dec. 14, 1951, p. 758; Dec. 21, 1951, p. 790; Dec. 28, 1951, p. 818.) *Metal Progress,* v. 65, June 1954, p. 162, 164, 166.

Definition, presence of surface films, testing and various causes of wear. (Q9)

595-Q. Steels for High Temperatures. (Digest of "Special Steels for Gas Turbines", by W. E. Bardgett and G. R. Bolsover; *Symposium on High-Temperature Steels and Alloys for Gas Turbines, Iron and Steel Institute, Special Report No.* 43, 1952, p. 135-148.) *Metal Progress,* v. 65, June 1954, p. 154, 156.

Effects of titanium, tungsten, columbium, cobalt, molybdenum and vanadium on creep resistance. (Q3, AY)

596-Q. The Effect of Quenching Strains on the Properties of an Al-Cu-Mg Alloy. H. A. Unckel. *Metallurgia,* v. 49, no. 295, May 1954, p. 220-222.

Small plastic strains applied after quenching affect yield stress considerably. Tables. 10 ref. (Q23, J26, Al, Cu)

597-Q. Variation of Hardness of Metals with Grain Size. E. O. Hall. *Nature,* v. 173, May 15, 1954, p. 948-949.

Shows relation of grain diameter to Brinell number. Graph. 6 ref. (Q29, M27)

598-Q. The Influence of Temperature and Rate of Strain on the Properties of Metals in Torsion. Clyde E. Work and Thomas J. Dolan. *University of Illinois Bulletin, (Engineering Experiment Station Bulletin Series no. 420,)* v. 51, no. 24, Nov. 1953, 109 p.

Cylindrical specimens 0.25 in. in diameter tested at four different constant strain-rates and at four different temperatures up to 120° F. Tables, graphs, photographs, diagrams. 132 ref. (Q1, ST, Al, Mg, Ti)

599-Q. (English.) **Determination of Residual Surface Stresses With the Aid of Resistance Wire Strain Gauges.** S. Sjöström. *Applied Scientific Research,* v. 4, sec. A, no. 4, 1954, p. 305-312.

Application of method to determine residual surface stresses in a case hardening gear tooth steel. Table, graphs. 7 ref. (Q25, AY)

600-Q. (English.) **Stress Pulse in Bar With Neck or Swell.** H. C. Fischer. *Applied Scientific Research,* v. 4, sec. A, no. 4, 1954, p. 317-328.

Transmission and reflection of an elastic rectangular stress pulse. Graphs, diagrams. 16 ref. (Q21)

601-Q. (Czech.) **Economic Heat Resisting Alloys for Temperatures Above 800° C.** Jaroslav Pluhar and Miloslav Vyklicky. *Slévarenství,* v. 2; *Prace Ceskoslovenského Vyzkumu Slévarenskénho,* v. 1, no. 3, 1954, p. 21-28.

Heat resistance of 29 alloys of iron-silicon, iron-silicon-aluminum and iron-aluminum with various amounts of carbon, up to 12% silicon and 33% aluminum. Steel specimens with 13 to 25% chromium and austenitic chromium-nickel steel. Specimens examined at 800 to 1100° C. Tables, graphs, micrographs. (Q general, Fe, Si, Al, AY, Cr, Ni)

602-Q. (German.) **The Poisson Constant of Metals.** *Applied Scientific Research,* v. 4, sec. A, no. 4, 1954, p. 329-336.

Accurate measurement of the Poisson ratio of 12 cubic metals. Photograph, tables. 27 ref. (Q21)

603-Q. (Book.) **A Critical Survey of Brittle Fracture in Carbon Plate Steel Structures Other Than Ships.** M. E. Shank. Welding Research Council of the Engineering Foundation, 29 West 39th St., New York 18, N. Y. $2.00.

Prepared for the National Research Council's Committee on Ship Structural Design. Problem of brittle fracture in mild steel includes water standpipes, a gas-holder, storage tanks, three Vierendeel truss bridges, other bridges, pressure vessels, power shovel booms and dipper sticks, penstock, gas transmission lines, welded steel stack, and a methane column. (Q26)

604-Q. (Book.) **The Determination of Torsion Constants for Bulbs and Fillets by Means of an Electrical Potential Analyser.** Research Report No. 22, Aluminium Development Association, 33 Grosvenor Street, London W. 1, England. 7s. 6d.

Apparatus, operation, and results for angle fillets, T-junction fillets, single and double-sided bulbs, and sections and fillets with unequal web thicknesses. (Q1, Al)

605-Q. (Book.) **Literature Survey on Weld-Metal Cracking.** Wright Air Development Center. Report No. PB 111285. 212 p. 1952. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $3.00.

Analysis of 800 individual papers concludes that most weld-metal cracking is interdendritic or intergranular and occurs largely at high temperatures. (Q26, K9)

606-Q. (Book—Russian.) **Contact Fatigue of the Teeth of Spur Gears.** G. K. Trubin. TsNIITMASh. Book No. 37. 150 p. Government Scientific-Technical Publishing House, Moscow.

Fundamental description of failures by wear, pitting, chipping of teeth, root fracture, and corrosion-fatigue fractures through pitted zone. Also, as affected by oil type, viscosity and rate of application. (Q26, Q9, Q7)

R

Corrosion

237-R. Mechanism of Corrosion Inhibition by Sodium Metaphosphate Glass. James C. Lamb, III, and Rolf Eliassen. *American Water Works Association, Journal,* v. 46, May 1954, p. 445-460.

Effects of corrosion products in water, theory of film deposition. Diagrams, graphs, table. 19 ref. (R10, Fe)

238-R. Corrosion and Its Control in Aluminum Cooling Towers. Sidney Sussman and J. R. Akers. *Corrosion,* v. 10, May 1954, p. 151-159.

Six commercial aluminum compositions were immersed in circulating waters in operating cooling towers. Serious pitting occurred with untreated and improperly treated circulating waters. Photographs, tables. 1 ref. (R4, Al)

239-R. Inspection of Petroleum Refinery Equipment. Edward H. Tandy. *Corrosion,* v. 10, May 1954, p. 160-163; disc., p. 163-164.

Conditions created by corrosive compounds in crude oils, formation of corrosive compounds during processing and use of corrosive process chemicals makes constant inspection of refinery equipment necessary. Diagram, graph, photograph. (R7)

240-R. Cathodic Protection in Florida Power and Light Company's Generating Plants. Joseph B. Prime, Jr. *Corrosion,* v. 10, May 1954, p. 165-168.

Cathodic protection of intake structures and seawater cooled condensers has proved practical and economical during the past five years. Diagrams, table. (R10, Cu, ST)

241-R. Low Carbon Stainless Resists Intergranular Corrosion. R. E. Paret. *Iron Age,* v. 173, May 6, 1954, p. 132-134.

Carbide formation in lower carbon grades occurs so slowly that normal welding and stress-relieving temperatures have no noticeable effect on corrosion resistance. Tables, photograph. (R2, SS)

242-R. Simple Corrosion Theory as an Aid to Materials Selection. II. T. K. Ross. *Petroleum,* v. 17, May 1954, p. 154-155, 184.

Differences in polarity about a metal surface may produce attack in seemingly innocuous and nearly neutral conditions. Various examples. Table, graph, diagram. (R1)

243-R. Economics of Cathodic Protection. Wayne A. Johnson. *Petroleum Engineer,* v. 26, May 1954, p. D18-D19.

Bare or coated pipe lines saved from costly leaks by cathodic protection. Graph. (R10)

244-R. Measuring Plant Corrosion Costs. V. B. Guthrie. *Petroleum Processing,* v. 9, May 1954, p. 708-709.

New technique analyzes costs proposed by study group. Table. (R general, A4)

245-R. (German.) **The Dissolution of Various Metals When in Contact With Rotating Platinum Electrodes.** Tihomil Markovic. *Werkstoffe und Korrosion,* v. 5, no. 4, Apr. 1954, p. 121-123.

Influence of cathode surface on rate of corrosion. Results indicate definite distribution of cathodic and anodic spots. Graphs, table. (R1, Zn, Al, Sn, Fe)

246-R. (Russian.) **Passivity of Iron in Concentrated Sulfuric Acid.** V. M. Novakovskii and A. I. Levin. *Doklady Akademii Nauk SSSR,* v. 94, no. 6, Feb. 21, 1954, p. 1113-1116.

Formula determines corrosion rate during oxidation of clean iron and corrosion of iron covered by iron sulfate. Graphs. 6 ref. (R6, R10, Fe)

247-R. (Russian.) **Composition of Photographically Active Particles Separated by Metals During Atmospheric Corrosion.** I. L. Roikh. *Doklady Akademii Nauk SSSR,* v. 94, no. 6, Feb. 21, 1954, p. 1117-1120.

Photographic effect results in separation of particles having ability to form a concealed image. Graphs. 8 ref. (R3)

248-R. (Russian.) **Resistance of Metals to Cavitation Corrosion in Fresh and Sea Water.** K. K. Shal'nev. *Doklady Akademii Nauk SSSR,* v. 95, no. 2, Mar. 11, 1954, p. 229-232.

Investigations on brass, bronze and gray cast iron reveal mechanism to be different from that formerly assumed. Graph, table, micrographs, diagrams. 14 ref. (R2, R4, Cu, Cl)

249-R. (Russian.) **Electrode Potentials and Corrosion of Molybdenum and Tungsten.** A. Ia. Shatalov and I. A. Marshakov. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 1, Jan. 1954, p. 42-50.

Systematic measurement in buffer solutions with varied chlorine-ion content. Graphs, tables. 19 ref. (R11, Mo, W)

250-R. (Russian.) **Influence of Surface-Active Substances on Corrosion of Cathodic Zinc.** V. S. Kolevatova and A. I. Levin. *Zhurnal Prikladnoi Khimii,* v. 27, no. 4, Apr. 1954, p. 456-460.

Detrimental action of nickel, copper, antimony and cobalt removed by additions of glue, beta-naphthol and soaproot. Diagram, micrographs, tables. 7 ref. (R10, Zn)

251-R. Cathodic Protection. I. L. L. Shreir. *Chemical & Process Engineering,* v. 35; *Corrosion Technology,* v. 1, May 1954, p. 63-65, 78.

Principles, applications, advantages and limitations, uses. Graphs, diagram, photographs. 16 ref. (R10)

252-R. Research Laboratories Tackle Corrosion Problems. *Chemical & Process Engineering,* v. 35; *Corrosion Technology,* v. 1, May 1954, p. 77-78.

Summary of results achieved and future plans recorded in 1952-53 D.S.I.R. report. (R general, A9)

253-R. Eight Uses for Insulating Joints. A. W. Peabody. *Gas Age,* v. 113, May 6, 1954, p. 25-30, 75-81.

Corrosion protection for gas distribution piping. Diagrams. (R10)

254-R. Practical Performance of Water-Conditioning Gadgets. B. Q. Welder and Everett P. Partridge. *Industrial and Engineering Chemistry,* v. 46, May 1954, p. 954-960.

Special devices requiring substantially no technical control are alleged to treat water by nonchemical means to prevent scale, corrosion and troubles encountered in industrial use of water. Table. 106 ref. (R4)

255-R. Significance and Application of Water Analysis Data. R. C. Ulmer. *Industrial and Engineering Chemistry,* v. 46, May 1954, p. 975-978.

Problems of boiler water chemistry including scale, sludge, corrosion, carry-over and embrittlement. Diagram, tables, photographs. 7 ref. (R4)

256-R. Corrosion in the Boiler. R. F. Andres. *Industrial and Engineering Chemistry,* v. 46, May 1954, p. 990-992; disc., p. 992.

Resume of recent theories and developments in field of chemical treatment of boiler waters for corrosion control. 14 ref. (R4, Fe)

257-R. After Boiler Corrosion. J. J. Maguire. *Industrial and Engineering Chemistry,* v. 46, May 1954, p. 994-996; disc., p. 996-997.

Prevention of corrosion of steam and condensate lines is integral part of complete feed water conditioning program. Steam produced from boilers must not only be low in solids content but should also be noncorrosive. Photographs, table. (R4, ST)

258-R. Mechanism of Filiform Corrosion. W. H. Slabaugh and Morris Grotheer. *Industrial and Engineering Chemistry,* v. 46, May 1954, p. 1014-1016.

Workable theory for mechanism of filiform, and control by considering those postulates which are basic to mechanism. Photographs, table, diagrams. 5 ref. (R1)

259-R. Neutral and Basic Sulfonates Hayward R. Baker, Curtis R. Singleterry and Edwin M. Solomon. *Industrial and Engineering Chemistry,* v. 46, May 1954, p. 1035-1042.

Evaluation of neutral dinonylnaphthalene sulfonates as rust inhibitors in lubricating oils. Exploratory investigation of special properties of basic barium soap as rust inhibitor in acid environments. Tables, graphs. 22 ref. (R10)

260-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 46, May 1954, p. 85A-86A, 88A.

Aluminum-iron alloys with and without molybdenum show excellent oxidation resistance and low corrosion by some aqueous solutions. Tables, graph, photograph. (R2, Al, Fe, Mo)

261-R. The Influence of Extrusion Direction on the Corrosion and Stress-Corrosion of Aluminium-Copper-Magnesium Alloys. E. A. G. Liddiard and Winifred A. Bell. *Institute of Metals, Journal,* v. 82, May 1954 p. 426-432 + 1 plate.

In fully heat treated condition extrusions show little susceptibility to stress-corrosion when stress is parallel with direction of extrusion. Tables, micrographs, photograph. 3 ref. (R1, Al)

262-R. Electrical Measurements in the Selection of Bolt Materials for Service Underground. W. J. Schwerdtfeger. *Journal of Research, National Bureau of Standards,* v. 52, May 1954, p. 265-274.

Effect of exposure on potentials of cast iron and galvanized iron as components of galvanic couples. Graphs, tables, photographs. 15 ref. (R8, T7, CI, CN)

263-R. MagnesiumAnodes Control Corrosion of Steel y Sea Water. *Magnesium,* 1954, Ma, p. 10-11.

Almost complete corrosion protection achieved i gasoline and

light petroleum products tanker. Photographs, table.
(R4, R10, Mg, ST)

264-R. Effect of Local-Action Currents on the Iron Potential. Herbert H. Uhlig. *National Academy of Sciences of the United States of America, Proceedings,* v. 40, May 1954, p. 276-285.

Dependence of corrosion potential on corrosion rate. Change of rate with pH. Graph. 16 ref.
(R1, Fe)

265-R. Stray Currents From Cathodic Protection Installations. C. A. Erickson. *Pipe Line News,* v. 26, May 1954, p. 39, 42-45.
(R10)

266-R. Comparative Analysis of Digester Corrosion Measurements. A. Ungar and T. E. Caywood. *Tappi,* v. 37, May 1954, p. 177-190.

Bulk of data supplied by alkaline pulp mills. Analysis concentrated on these. Tables, graphs. 15 ref.
(R7)

267-R. (Italian.) **Theoretical and Experimental Study of Some Phenomena of Dezincification in Brasses. II. Means of Preventing Dezincification Phenomena.** Paolo Lombardi. *Metallurgia italiana,* v. 46, no. 3, Mar. 1954, p. 91-96.

Effect of addition elements. Graphs, table. (To be continued.)
(R2, Zn, Cu)

268-R. (Russian.) **Corrosion of Metals by Saturated Fuel.** I. N. Putilova, L. G. Gindin and E. V. Artamonova. *Doklady Akademii Nauk SSSR,* v. 94, no. 3, Jan. 21, 1954, p. 489-492.

Effect of kerosene on carbon and low-alloy steels; magnesium and its alloys. Tables. 9 ref.
(R7, Mg, CN, AY)

269-R. (Russian.) **Oxidation of Iron in Air at High Temperatures.** V. V. Ipat'ev and V. I. Tikhomirov. *Doklady Akademii Nauk SSSR,* v. 94, no. 3, Jan. 21, 1954, p. 505-508.

Rate of oxidation, composition and structure of scale produced during oxidation of Armco iron at high temperatures in dry and moist atmospheres. Diagram, graphs, photograph. 15 ref. (R2, Fe)

270-R. (Russian.) **Dependence of Iron Corrosion Velocity on the pH of KCl Salt Solution.** L. K. Lepin' and A. Ia. Vaivade. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 3, Mar. 1954, p. 435-439.

Experiments with various pH values from 3 to 9. Table, graph. 10 ref. (R11, Fe)

271-R. (Russian.) **Oxidation of Iron and Steel at High Temperatures.** N. P. Zhuk and B. V. Linchevskii. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 3, Mar. 1954, p. 440-452.

Kinetics of oxidation in a temperature range of 400 to 1100° C. Diagram, tables, graphs. 30 ref.
(R2, CI, ST)

272-R. (Russian.) **Action of Molten Chlorides of Lithium, Sodium, Potassium on Nickel, Copper, and Certain Steels.** E. I. Gurovich. *Zhurnal Prikladnoi Khimii* v. 27, no. 4, Apr. 1954, p. 425-432.

Corrosion rates and passivation. Graphs, tables, diagram. 8 ref.
(R10, Ni, Cu ST)

273-R. The Effect of Pesticides on Application Equipment. J. A. Kelly. *Down to Earth* v. 10, no. 1, Summer 1954, p. 12-14.

Sprayer tank corrosion, machinery paints, abrasions and other deteriorations. Potograph, tables. 4 ref. (R general)

274-R. Mathematical Studies on Galvanic Corrosion I. Coplanar Electrodes With Ngligible Polarization. J. T. Waber. *Electrochemical Society, Journal,* v. 101, June 1954, p. 271-276.

Distribution of potential within an electrolyte produced by a coplanar arrangement of electrodes. Diagrams, table. 8 ref. (R1)

275-R. Economics of Cathodic Protection. II. Applications of Economic Analysis. Ray M. Wainwright. *Gas,* v. 30, May 1954, p. 44-48.

Six points to consider in a typical corrosion control situation. Diagram. 3 ref. (R10)

276-R. Prevention of Water Corrosion. Peter W. Sherwood. *Mining Magazine,* v. 90, May 1954, p. 275-280.

Causes of corrosion, prevention by means of inhibitors, coatings and cathodic protection. 4 ref.
(R4, R10, L general)

277-R. Control Corrosion and Improve Product Quality. F. Lawrence Resen. *Oil and Gas Journal,* v. 53, June 7, 1954, p. 111-112, 115.

New organic inhibitor neutralizes organic acids and scrubs out inorganic acids. Photographs, diagrams.
(R10)

278-R. (Russian.) **Reasons for Inhibition of Cathodic Zinc Corrosion in Presence of Surface-Active Substances.** V. S. Kolevatova and A. I. Levin. *Zhurnal Prikladnoi Khimii,* v. 27, no. 5, May 1954, p. 506-513.

Inhibiting action of additives on cathodic and anodic processes. Diagram, tables, graphs. 9 ref.
(R10, Zn)

279-R. (Book.) **Condensate Well Corrosion.** 203 p. 1953. Natural Gasoline Association of America, 422 Kennedy Bldg., Tulsa, Okla. $6.00.

Problems incident to corrosion in gas condensate wells. Information of economic nature, experimental procedure, laboratory vs. field experience correlation, ratings of efficiencies of various systems of control, and numerous case histories.
(R7)

280-R. (Book.) **Performance of Stainless Steels in Petroleum Refinery Service.** 44 p. 1953. United States Steel Corp., 525 William Penn Place, Pittsburgh, Pa. Free.

General corrosion including atmospheric, wet chemical, and elevated temperatures; and intergranular corrosion including carbide precipitation and attack by molten metals and sulfur. (R general, SS)

281-R. (Book.) **Pipe Line Corrosion and Cathodic Protection, A Field Manual.** Marshall E. Parker. 104 p. Gulf Publishing Co., P. O. Box 2608, Houston, Tex. $3.00.

Soil resistivity, potential surveys, line currents, current requirement surveys, rectifier systems for coated lines, ground bed design and installation, magnesium anodes on coated lines, hot spot protection, stray current electrolysis, interference in cathodic protection, operation and maintenance, and coating inspection and testing. (R10, ST)

282-R. (Book.) **Proceedings of the Short Course in Corrosion Held at the University of California.** 119 p. 1953. University of California, Berkeley, Calif. $5.00.

Fundamentals of stress-corrosion of ferrous and nonferrous metals; coatings; corrosion in process industry and in public water systems; cathodic protection principles and practices; corrosion study and testing including use of radiotracer techniques; and high-temperature corrosion. (R general)

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S
Inspection and Control

222-S. How Functional Specifications Affect Gaging Requirements. Earle Buckingham. *Machinery,* v. 60, May 1954, p. 185-191, 211.

Tolerances established to control variations in size, form, position and function. Need for functional specifications and determination of gaging requirements. Diagrams.
(S14)

223-S. Die Measurement and Inspection. J. G. Wistreich. *Wire and Wire Products,* v. 29, May 1954, p. 515, 570.

New instrument measures die angles; facilitate servicing operations in die rooms of wire mills. Photographs. (S14, F28)

224-S. (French.) **Contamination of Samples in the Electronic Microanalyzer.** Raymond Castaing and Jacques Descamps. *Comptes rendus,* v. 238, no. 14, Apr. 5, 1954, p. 1506-1508.

Observations during intense and prolonged bombardment of metallic surface by X-ray beams. Reduction of deposit formation by removing organic vapors. Spectrograms. 3 ref. (S11)

225-S. Sheet and Plated-Metal Measurements With a Phase-Angle-Type Probe. W. A. Yates and J. L. Queen. *Communication and Electronics,* 1954, May, p. 138-142.

Basic operating principles and design data for an instrument to measure metal thickness or plating depth for nonferrous materials. Graphs, diagrams. (S14, EG-a)

226-S. Unified Standards for Limits and Fits. Rowland Hill. *Engineering Journal,* v. 37, May 1954, p. 576-585.

Various national standard systems, development of new ABC system. Diagrams, graphs, tables.
(S22, S14)

227-S. Multirange, Audiofrequency Thermocouple Instruments of High Accuracy. F. L. Hermach and E. S. Williams. *Journal of Research, National Bureau of Standards,* v. 52, May 1954, p. 227-234.

One is used with d.c. potentiometer for measurements of a.c. voltage and current with accuracy of 0.05% at frequencies up to 20 kc. per sec. Second is a 0.5% multirange volt-ammeter with simple circuits so thermal converter may be checked. Photographs, tables, graph, diagrams. 3 ref. (S16)

228-S. A Comparator for Materials of Low Magnetic Susceptibility. D. A. Abbott and R. Kilgour. *Journal of Scientific Instruments,* v. 31, May 1954, p. 155-158.

Magnetic states of weakly magnetic materials, such as phosphor bronze, copper and filled rubber compared. Diagrams, photographs.
(S10, P16, Cu)

229-S Stainless Steel Welding Rods and Bare Electrodes. *Welding Journal,* v. 33, May 1954, p. 433-437.

Two years in drafting, new specifications for bare wire filler metals are available as AWS Specification A5.9-53T or ASTM Specification A371-53T. Diagrams, tables.
(S22, T5, SS)

230-S. Automatic Inspection Incorporated in Cylinder Block Automation. Thomas Mac New. *Automotive Industries,* v. 110, June 1, 1954, p. 52-54. 128.

Manufacturing process used on new automobile engine. Photographs. (S general, CI)

231-S. Dimensions and Tolerances for Mass Production. (Summary-1). Earle Buckingham. *Machinery,* v. 60, June 1954, p. 184-190.

Steps necessary to complete dimensional information on drawings. Diagrams. (S22)

232-S. Instrument Pens. Leo Walter. *Mechanical World and Engineering Record,* v. 134, May 1954, p. 204-208.

Factors relating to use of pens in measurement and control instruments. Photographs, diagrams. 2 ref. (S14, S12)

233-S. (Czech.) Casting Surface Control. Otakar Moravek. *Slévarenstvi,* v. 2, no. 4, 1954, p. 104-106.

New oil test for surface defects of castings. Photographs, diagram, micrograph. (S13)

T

Applications of Metals in Equipment

173-T. Piping, Pumps and Valves for Atomic Reactors. Alfred Amorosi. *Heating, Piping & Air Conditioning,* v. 26, May 1954, p. 140-144.

Radioactivity problems of high-pressure, water - cooled nuclear plants; their effects on material selection and design of components. Diagrams, graphs, tables. (T25)

174-T. Titanium Weldment Replaces Steel Mortar Baseplate. C. Hartbower. *Machinery,* v. 60, May 1954, p. 182-184.

Advantages of light weight and high strength. Tables, photographs. (T2, K general, Ti)

175-T. How Proper Materials Selection and Use Leads to Cost Reduction. *Materials & Methods,* v. 39, May 1954, p. 70-116.

Savings through design, form and materials; 135 case histories. Photographs, diagrams. (T general)

176-T. The Precious Metals Industry. L. B. Hunt. *Metal Industry,* v. 84, Apr. 30, 1954, p. 353-356.

Industrial applications of silver, platinum and the platinum metals. Photographs.

(T general, EG-c, Ag, Pt)

177-T. Materials for Large Army Gun Tubes. A History. I. Cast Iron. Peter R. Kosting. *Metal Progress,* v. 65, May 1954, p. 90-95, 152, 154.

Methods of casting and testing in 1800's. Diagrams, tables. 18 ref. (T2, CI)

178-T. Selection and Heat Treatment of Tool and Die Steels. I. Howard E. Boyer. *Modern Machine Shop,* v. 26 May 1954, p. 120-127.

General information for tool and process engineers and tool and die makers. Table, photographs. (To be continued.)
(T6, J general, TS)

179-T. All-Aluminum Gas Line Is Unique Installation. Bill Slocum. *Petroleum Engineer,* v. 26, May 1954, p. D48-D50.

Lightweight aluminum pipe used on 12-mile, 8-in. gas line is welded by new-type automatic welding machines. Method involves less equipment and manpower. Photographs. (T4, K1, Al)

180-T. Aluminum Alloys in Hopper Cars. E. T. Englehart and G. B. Hauser. *Railway Locomotives and Cars,* v. 128, May 1954, p. 62-66.

Appraisal of results obtained in 75 experimental cars of 11 owners and in different classes of service. Photographs, tables. (T23, Al)

181-T. Effecting Economies With High-Strength Steels. A. F. Stuebing. Paper from "Materials for Product Development 1953". Clapp & Poliak, p. 73-82.

Examples in many forms of heavy equipment. (T general, AY)

182-T. Materials for High-Temperature Service. Howard C. Cross. Paper from "Materials for Product Development 1953". Clapp & Poliak, p. 117-144; disc., p. 159-161.

Plastics in aircraft applications, progress of the newer metals, aluminum, titanium, chromium, molybdenum and ceramics. Graphs, tables. (T24, Al, Cr, Mo, Ti)

183-T. Materials and the Atomic Age. J. C. Robinson. Paper from "Materials for Product Development 1953". Clapp & Poliak, p. 162-170; disc., p. 170-172.

Review of secondary aspects and possibilities of U.S. A.E.C. work, especially with zirconium, hafnium and beryllium. (T25, Zr, Hf, Be)

184-T. Selecting Materials for Roller Bearings. Theodore Jagen. Paper from "Materials for Product Development 1953". Clapp & Poliak, p. 251-255.

Demands close cooperation between several management groups to improve and reduce cost of bearings. Permanent committee studies materials and methods. (T7)

185-T. (German.) Aluminum in the Motorcycle. Curt Bücken. *Aluminium,* v. 30, no. 4, Apr. 1954, p. 139-151.

Advantages of light weight, thermal conductivity and appearance. Photographs, diagrams, tables, graphs. (T10, Al)

186-T. 1.5 Per Cent Carbon Cast-Steel Railroad-Car Wheels. N. A. Matthews and R. A. Flinn. *ASME, Transactions,* v. 76, May 1954, p. 617-621.

Cast steel found superior to chilled iron for wheels subjected to severe operating conditions. Micrographs, diagram, tables. (T23, CI)

187-T. Magnesium's Advantages in Textbook Production. William I. Frisch. *Bookbinding & Book Production,* v. 59, May 1954, p. 80-81.

Objective evaluation of advantages of magnesium for publishers relying on single and multi-color letterpress. (T9, Mg)

188-T. The Theory of High Pressure Vessel Design. B. A. Finlay. *Chemical & Process Engineering,* v. 35, May 1954, p. 147-150, 155.

Mathematical principles on which design is based, application in practice. Graphs, tables. 12 ref. (T26)

189-T. Materials for Nuclear Reactors. Stuart McLain. *Chemical Engineering Progress,* v. 50, May 1954, p. 240-244.

Material choices for typical reactors. Tables. (T25)

190-T. Metals and Marine Engineering. S. F. Dorey. *Engineering,* v. 177, May 7, 1954, p. 589-590.

Applications of nonferrous metals. Considers corrosion, fatigue, bearing materials and fusion jointing.
(T22, EG-a)

191-T. Maintenance Applications for Wire Thread Inserts. Howard O. Haas. *Industry and Power,* v. 66, May 1954, p. 91-93.

Engine cylinder heads and other costly parts with thread damage are easily put back into service. Photographs, table. (T7)

192-T. Steels for Steam Power Plant. A. M. Sage. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 167, no. 4, 1953, p. 414-424; disc., p. 424-433.

Effects of creep properties in different steels led to adoption of chromium-molybdenum, and chromium-molybdenum-silicon and, to a less extent, molybdenum-vanadium steel for superheater tubes, steam pipes and superheater headers for plant using temperatures above 900° F. Future developments outlined. Graphs, tables, micrographs. 16 ref. (T25, Q3, AY)

193-T. Precision Elements. C. F. Alban. *Instrumentation,* v. 7, no. 3, 1954, p. 33-35.

Design and uses of thermostatic bimetals. Photographs. (T8, SG-a)

194-T. Heavy Metals. Don Wackerle. *Machine Design,* v. 26, May 1954, p. 143-147.

Uses and fabrication of high-density alloys by powder metallurgy. Photographs, graphs, table.
(T general, H general, W, Ni)

195-T. Temperature-Compensator Alloys. Warren S. Eberly. *Machine Design,* v. 26, May 1954, p. 152-156.

Provide automatic temperature correction of magnetic and electrical properties in instrumentation devices. Photograph, tables, graphs, diagram. (T8, P15, P16, Fe, Ni)

196-T. Designing With Aluminum. VII. Aluminum for Ducts. *Product Engineering,* v. 25, May 1954, p. 339-340.

Results in reduced heat and friction losses, good corrosion resistance and duct size reduction. Graphs. (T27, Al)

197-T. Cast Alloys Tops for Hot Spots. E. A. Schoefer. *Steel,* v. 134, May 24, 1954, p. 122-125.

Lists cast alloys or combinations of several that can handle any high-temperature job. Tables, photographs. (T general, SG-h)

198-T. Aluminium in Mining Equipment. *Times Review of Industry,* v. 8, new ser., May 1954, p. 26.

Possible sparking hazards investigated. Photographs. 2 ref.
(T28, Al)

199-T. (French.) Steel Radiators. J. Reniers. *Ossature metallique,* v. 19, no. 5, May 1954, p. 257-270.

Production characteristics and application of section and panel radiators. Diagrams, photographs.
(T27, ST)

200-T. (German.) Materials for High Steam Temperatures. K. Wellinger. *Brennstoff-Wärme-Kraft,* v. 6, no. 4, Apr. 1954, p. 144-145.

Application of special steels for boiler construction. Methods for determining their strengths at wall temperatures above 575° C. Graph. 19 ref. (T25, Q23, ST)

201-T. (German.) Aluminum as a Material in Modern Bridge Building. W. Bleicher. *Metall,* v. 8, nos. 9-10, May 1954, p. 358-362.

Mechanical properties of Al-Mg-Si alloy. Photographs, diagrams. 7 ref. (T26, Q general, Al)

202-T. Problems in Developing Alloy Steels for Aircraft Gas Turbines. F. L. Ver Snyder. *Iron and Steel Engineer,* v. 31, May 1954, p. 115-123; disc., p. 123.

High temperatures bring need for new products. Diagram, photomicrograph, graphs, tables, photographs. 13 ref. (T25, SG-h)

203-T. Materials for Large Army Gun Tubes. A History. II. Wrought Iron and Brass Cannon. Peter R. Kosting. *Metal Progress,* v. 65, June 1954, p. 91-95.

Methods of casting and testing in 1800's. Table, diagrams. (T2, Cu, Fe)

204-T. Aluminum Everywhere. *Metal Progress,* v. 65, June 1954, p. 113-114.

Autoradiography in aluminum metallurgy. Construction of new Alcoa building. Photographs. (T26, M23, Al)

205-T. Use Silver for Current Carrying Switchgear Contacts and Joints. E. M. Troischt and T. J. Connor. *Plant,* v. 9, June 1954, p. 39-43, 90.

Methods of applying silver, essentials of satisfactory contacts and recommendations for protection and proper maintenance. Photographs. 8 ref. (T1, Ag)

206-T. The Challenge of Design in Airframe Development. P. Litherland Teed. *Shell Aviation News,* 1954, no. 190, Apr., p. 6-9.

Task of metallurgist in materials development for future aircraft. Tables, graphs. (T24)

207-T. Building Products Firm Develops New Machines, Uses for Aluminum. Howard E. Jackson. *Western Metals,* v. 12, May 1954, p. 61-63.

Evolution of aluminum building products. Photographs. (T26, Al)

208-T. (Book.) **Bulbed and Lipped Structural Aluminium Alloy Sections (Angles and Channels).** Addendum to Application Brochure No. 6. Aluminium Development Assn., 33 Grosvenor Street, London W. 1, England.

Compares recommended strut curve with Perry curve for channel sections. Data on equal and unequal bulb angles and channels. (T26, Al)

209-T. (Book.) **Fully Supported Aluminium Roof Covering.** Applications Brochure No. 9. 32 p. 1953. The Aluminium Development Association, 33 Grosvenor Street, London W.1, England. 2s 6d.

Appropriate materials in relation to British Standards applying to sheet and strip; wire and bars; and rods and sections. (T26, Al)

210-T. (Book—German.) **(Plain Bearings.) Gleitlager.** E. Schmid and R. Weber. 394 p. 1953. Springer-Verlag, Berlin. 45 DM.

Theory of bearings and bearing testing. Metallic and nonmetallic materials, properties, recommendations, and applications for specific purposes. (T7)

V

Materials

General Coverage of Specific Materials

153-V. Reynolds R-301 (Hard-Clad Wrought Aluminum Alloy). *Alloy Digest,* no. Al-16, May 1954.

Composition, physical constants, properties, heat treatment, corrosion resistance and general characteristics. (Al)

154-V. Chase Tellurium Copper (Free-Cutting, High Conductivity Copper Alloy). *Alloy Digest,* no. Cu-16, May 1954.

Composition, phsyical constants, properties, machinability, workability, weldability, corrosion resistance and general characteristics. (Cu)

155-V. Duriron (Corrosion and Wear Resistant Iron Alloy). *Alloy Digest,* no. Fe-5, May 1954.

Composition, physical constants, properties, machinability, weldability, corrosion resistance and general characteristics. (CI)

156-V. Dowmetal H (Heat Treatable Magnesium Casting Alloy). *Alloy Digest,* no. Mg-9, May 1954.

Composition, physical constants, properties, heat treatment, machinability, weldability, corrosion resistance, finishing and general characteristics. (Mg)

157-V. Nimonic 80 Nimonic 80A (Heat and Corrosion-Resisting Nickel-Base Alloys). *Alloy Digest,* Ni-10, May 1954.

Composition, physical constants, properties, machinability, workability, weldability and general characteristics. (Ni)

158-V. AISI 4140 (Oil-Hardening Cr-Mo Steel). *Alloy Digest,* no. SA-18, May 1954.

Composition, properties, heat treatment, machinability, weldability and general characteristics. (AY)

159-V. Zamak-5 (Zinc Die Casting Alloy). *Alloy Digest,* no. Zn-2, May 1954.

Composition, physical constants, properties, castability, workability, machinability, weldability, heat treatment, corrosion resistance and general characteristics. (Zn)

160-V. Some Early Goldwork. Charles Singer. *Endeavour,* v. 13, Apr. 1954, p. 86-93.

Early surviving pieces indicate high degree of craftsmanship and wide empirical knowledge of physical properties of metal. Drawings, maps, photographs. (T9, A2, Au)

161-V. Materials Data Sheet. Uranium and Thorium. *Materials & Methods,* v. 39, May 1954, p. 229.

Physical, mechanical, and fabricating properties. Also corrosion resistance, forms and uses. (U, Th)

162-V. The Metallurgy of Titanium and Zirconium. W. J. Kroll. *Metal Industry,* v. 84, Apr. 23, 1954, p. 325-327.

Critical review of existing patents. Behavior of both metals at high temperature, under various conditions of exposure. Diagrams. 19 ref. (To be concluded.) (Ti, Zr)

163-V. The Aluminium Industry in Great Britain. E. G. West. *Metal Industry,* v. 84, Apr. 30, 1954, p. 345-348.

Present capacities and general trends. Photographs. (Al)

164-V. The British Copper Industry. E. Voce. *Metal Industry,* v. 84, Apr. 30, 1954, p. 357-359.

Present production facilities and mineral sources. Photographs. (Cu)

165-V. Aluminum Alloys for Permanent Mold and Die Casting. *Metal Progress,* v. 65, May 1954, p. 112-B.

Table of composition and mechanical and physical properties of various types. (E13, Q general, Al)

166-V. Péchiney Beryllium Copper. *Microtecnic (English Ed.),* v. 8, no. 1, 1954, p. 43-50.

Physical, mechanical and chemical properties, machining and applications. Diagram, tables, graph. (Cu)

167-V. The Case for Blue Ribbon Steels. *Steel,* v. 134, May 10, 1954, p. 114-117.

Alloy versus carbon steels. Alloys are expensive but necessary in some cases. Diagrams, graphs, photograph. (AY, CN)

168-V. Industry Leans Heavily on Light Metals. *Steel,* v. 134, May 10, 1954, p. 118-120.

Includes "Cheaper Magnesium Mill Products", W. H. Gross and P. L. Filter; "Higher Strength Aluminum Alloys"', Bruce E. Brennan; "Aluminum Design Tips", J. R. Willard; "Promising Al-Mg Alloys", J. R. Young; and "Magnesium Tops for Deep Draws", J. S. Kirkpatrick. Photographs. (Al, Mg)

169-V. Copper-Base Alloys. Toughness and Hardness Have Been Added. *Steel,* v. 134, May 10, 1954, p. 125, 128.

Engineering alloys of precise composition. Predictable properties widen opportunities for application. Photographs. (Cu)

170-V. Now You Can Use Titanium. C. I. Bradford. *Steel,* v. 134, May 10, 1954, p. 148-150.

As mass production lowers cost, nondefense users will use more. Characteristics presented. Table, photographs. (To be continued.) (Ti)

171-V. Titanium. George T. Fraser. Paper from "Materials for Product Development 1953". Clapp & Poliak, p. 85-93.

Fabrication, forming, applications and economics. Photographs, graph, tables. (Ti)

172-V. (French.) **Bessemer Oxygen Steels. Their Industrial Production and Fields of Applicataion.** Jean Wurth. *Ossature métallique,* v. 17, no. 4, Apr. 1954, p. 205-224.

Properties and advantages. Graphs, photographs, tables. 9 ref. (D3, T general, ST)

173-V. Aluminum 14S. Heat Treatable Aluminum Forging Alloy. *Alloy Digest,* no. Al-17, June 1954.

Composition, physical constants, properties, heat treatment, machinability, weldability, corrosion of and general characteristics. Tables. (Al)

174-V. Mueller 600 Bronze. Strong Bearing Bronze. *Alloy Digest,* no. Cu-17, June 1954.

Physical constants, properties, machinability and general characteristics. Tables. (Cu)

175-V. A. S. T. M.-WC1. Alloy Cast Steel. *Alloy Digest,* no. SA-19, June 1954.

Composition, physical constants, properties, machinability and general characteristics. Tables. (AY)

176-V. Mayari-R. Low-Alloy, High-Strength Steel. *Alloy Digest,* no. SA-20, 1954.

Composition, properties, workability and general characteristics. Tables. (AY)

177-V. MISCO-C. Corrosion & Heat Resistant Alloy. *Alloy Digest,* no. SS-15, June 1954.

Composition, physical constants, properties, machinability, corrosion and general characteristics. Tables. (SS)

178-V. MST 3AL-5CR. Titanium-Base Forging Alloy. *Alloy Digest,* no. Ti-4, June 1954.

Composition, physical constants, properties, machinability, weldability and general characteristics. Tables. (Ti)

179-V. Champaloy. Oil-Hardening Tool Steel. *Alloy Digest,* no. TS-21, June 1954.

Composition, properties, heat treatment, machinability and general characteristics. Graph, tables. (TS)

180-V. High Alloy Casting. *Canadian Metals,* v. 17, May 1954, p. 26-27.

Alloys with properties particularly suited to rigorous conditions of high temperature and pressure. Photographs. (E general, SS, CI)

181-V. New Boron Steel Gives Superior Properties. *Canadian Metals,* v. 17, May 1954, p. 52, 54.

High ductility, fatigue resistance, tensile strength and superior machinability. Tables. (AY)

182-V. Tin Brasses. VI. *Copper & Brass Bulletin,* 1954, May, no. 168, p. 8-9.

Properties and maritime uses. Table. (To be continued.) (T22, Cu)

183-V. Nodular Cast Iron. S. B. Bailey. *Iron & Steel,* v. 27, May 1954, p. 193-196.

Present position and future prospects of economic and engineering developments. Graphs, table. (CI)

184-V. Pearlite-Free Basic Bessemer Steel: Its Fabrication and Properties. Åke Josefsson. *Iron and Steel Insti-*

tute, Journal, v. 177, May 1954, p. 118-128 + 1 plate.

Easily and economically produced. Impact tests on plates and bend tests on welded specimens. Tables, graphs, diagram, micrographs, photographs. 11 ref. (CN)

185-V. Titanium. Harry S. Brenner. *Machine Design,* v. 26, May 1954, p. 136-140.

Steady development shows widespread commercial application may not be far distant. Photographs. (T general, Ti)

186-V. Zirconium. John D. Roach. *Machine Design,* v. 26, May 1954, p. 156-158.

Properties and uses of this high-strength, low-density, noncorrosive metal. Photographs, tables. (Zr)

187-V. Beryllium. Gordon F. Simson and Simon J. Morana. *Machine Design,* v. 26, May 1954, p. 176-180.

Besides its influence in beryllium copper, other properties and applications are provided. Tables, graph, micrographs. 5 ref. (Be)

188-V. Graphite in Industry. J. Lomas. *Machinery Lloyd (Overseas Ed.),* v. 26, Apr. 24, 1954, p. 75-77.

Advantageous uses of colloidal, electrically produced graphite include lubrication, parting powder in foundry molds, impregnation of metallic and other surfaces and electronics. (E19, G21, H16, Ti, C)

189-V. Titanium, Companion-Metal to Magnesium. *Magnesium,* 1954, May, p. 12-16.

Various uses and properties. Development of deep drawing. Photographs, table, graph. (G4, Ti)

190-V. The Metallurgy of Titanium and Zirconium. W. J. Kroll. *Metal Industry,* v. 84, Apr. 23, 1954, p. 325-327; May 7, 1954, p. 401-403.

Critical review of existing patents. Behavior of both metals at high temperature under various conditions of exposure. Diagrams, tables. 41 ref. (Ti, Zr)

191-V. Tin Compounds and Alloys. Ernest S. Hedges. *Times Review of Industry,* v. 8, new ser., May 1954, p. 24-25.

Outlets recently developed in plastics, pestology and metallurgy. Photographs. (Sn, Cu)

192-V. Literature Survey of High-Strength Steels. *Welding Journal,* v. 33, May 1954, p. 251-256.

Composition and properties of American and European high-yield-strength steels. Table. 16 ref. (ST)

193-V. (Dutch.) **Working and Processing of Aluminum.** A. Jager. *Bedrijf en Techniek,* v. 9, no. 200, Apr. 24, 1954, p. 199-203.

Properties and use of various alloying elements for different applications. Table. (Al)

194-V. (German.) **Titanium.** A. Von Zeerleder. *Metall,* v. 8, nos. 9-10, May 1954, p. 347-351.

Historical review. Reduction of titanium compounds, current research, properties and application. Diagrams, tables. 14 ref. (Ti)

195-V. The Coming Role of Titanium. R. W. Hanzel. *Consulting Engineer,* v. 3, May 1954, p. 56-59.

Commercial forms, mechanical and physical properties, general information on future. Tables. (Ti)

196-V. The Metalloid Germanium. Norman Clarke Jones. *Industrial Chemist and Chemical Manufacturer,* v. 30, May 1954, p. 229-230.

Extraction, properties and applications. Photograph. (Ge)

197-V. Application of Bronze Bearing Alloys. James L. Duchene. *Iron and Steel Engineer,* v. 31, May 1954, p. 92-97.

Considers fatigue strength, embeddability, conformability, seizure resistance, corrosion resistance and method of manufacture. Photographs, micrographs. (T7, Cu)

198-V. Wrought Aluminum Alloys. *Metal Progress,* v. 65, June 1954, p. 112-B.

Table of compositions, properties and designations of commercial alloys. (Al)

199-V. Modern Stainless Steels. Robert H. Aborn. *Metal Progress,* v. 65, June 1954, p. 115-125.

Corrosion evaluation, chemical and mechanical properties, uses and extrusion. Photograph, graphs, micrographs, diagrams. (SS)

200-V. Western Products Utilize Brass Forgings for High Strength, Machinability. *Western Metals,* v. 12, May 1954, p. 56-60.

Production of products which require high corrosion resistance, good machinability and finish; ease of fabrication and a range of strength, toughness and other physical characteristics. Photographs.
(T general, P general, Q general, Cu)

201-V. (German and French.) **Titanium.** *Pro-Metal,* v. 6, no. 38, Apr. 1954, p. 322-333.

Deposits, properties, production and applications. Tables, graphs, photographs. (Ti)

202-V. (Book.) **Carbide Seminar Reports.** Lee N. Gulick, editor. University of Pennsylvania, Philadelphia 4, Pa. $3.00.

Economics of carbide in tool fabrication and maintenance; single point tooling results; new carbide applications such as milling, gun drilling, and trepanning; and detailed data on heat, impact, and corrosion resistance. (G17, C-n)

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POSITIONS WANTED

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METALLURGIST: B.S. degree, age 29. Five years experience, principally with aluminum alloys, also other nonferrous casting alloys. Experienced in foundry research, production, service engineering, radiography, quality control, physical testing and steel heat treatment. Excellent record. Desires responsible position in production or sales service engineering. Box 7-70.

PHYSICAL METALLURGIST: Ph.D. degree, age 31. Doctoral thesis concerned titanium. Training in nuclear reactors. Experience in handling radioactive materials. Approximately two years industrial experience. Publication. Desires academic or research position. No location preference. Box 7-75.

METALLURGICAL ENGINEER: B.S. degree, Case 1944. Desires stable position with progressive company in development and application metallurgy. Has wide experience in development and control engineering of nonferrous metals. Age 32. Prefers Northern Ohio. Married, two school-age sons. Minimum $6200 per year. Box 7-80.

METALLURGICAL ENGINEER: B.S. degree, Case Institute of Technology. Age 34, married. Six years experience in heat treating, both as layman and supervisor, with additional experience in electroplating and in the metallurgical control of steel production in openhearth, rod and strip mills. Desires position with opportunity for advancement in production or sales engineering. Box 7-85.

METALLURGIST: B.S. in metallurgical engineering, recent graduate N.Y.U. Age 21, married. Educational emphasis on physical metallurgy, materials engineering. Strong background in physics and chemistry. Electives in engineering law, distribution, economics, industrial management, statistical methods, quality control. Thesis on construction of Ti-Sb phase diagram. Some business experience. Plans graduate evening study. Desires position in production and development, preferably in New York area, but not essential. Box 7-90.

METALLURGICAL ENGINEER: M.S. degree, age 26, married. Degrees from scientific universities in India and from Carnegie Tech and Polytechnic Institute of Brooklyn. Experience includes two years in metallurgical department, openhearth shops, rolling mills, wire and plate mills at steel company. Also blast furnace experience. Desires position in U. S. on permanent status. Box 7-95.

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METALLURGICAL ENGINEER: B.S. degree, age 33, married, three children. Desires position in technical sales. Five years diversified experience in research and development field includes three years in foundry work with excellent background in precision casting methods. Box 7-105.

METALLURGICAL ENGINEER: Graduate work in physical metallurgy, corrosion, iron, steel and nonferrous metallurgy, X-ray metallography and mining. Research work for two years in U.S.A. B.S. degree in chemical engineering from Greece. Veteran, single, age 33. Five years experience in chemical and metallurgical laboratories, and with commercial and government specifications for materials. Some industrial. Desires diversified work in metallurgical field, preferably in Canada. Box 7-110.

METALLURGIST: B.S.E., M.S.E. degrees in metallurgy. Veteran, family, age 28. One year production, three years industrial research, varied experience in vacuum and air melting of most types of metals and alloys, metallography, physical testing, heat treating, specifications and hardenability problems, theoretical metallurgical calculations, special fabrication techniques, refractories and ceramics. Well-read, practical. Box 7-115.

METALLURGICAL ENGINEER: B.S. degree in metallurgy, age 32, family. Diversified experience in heat treating, material selection, trouble shooting and metal finishing. Desires responsible position with progressive West Coast firm, preferably in San Francisco Bay area. Box 7-120.

SALESMAN, SALES ENGINEER: Graduate metallurgist, 17 years diversified experience in metallurgy and sales engineering of alloy steels, particularly corrosion and heat resistant grades. Aggressive, good sales personality. Desires connection with producer, warehouse, fabricator or export-import firm. Box 7-125.

METALLURGISTS

looking for opportunities
in the field of

ATOMIC ENERGY

METALLOGRAPHERS	B.S. plus 2 or more years experience in non-ferrous metallography
METALLURGISTS **SOLID STATE PHYSICISTS** **PHYSICAL CHEMISTS**	B.S. — M.S. — Ph.D. Fundamental and applied work in corrosion, physical metallurgy, high-temperature problems
METALLURGICAL or **WELDING ENGINEERS**	B.S. — M.S. Applied work in weldability studies, welding methods, etc.

Send resume' and salary requirements to
Central Employment Office
Technical Personnel

CARBIDE and CARBON CHEMICALS COMPANY

A Division of Union Carbide and Carbon Corporation
Post Office Box P
Oak Ridge, Tennessee

PHYSICAL CHEMIST: Ph.D. degree. Almost 15 years of creative productivity in most metals, available for top level research and development activities. Record of aggressive achievements in refractory metals, semiconductors, rarer metals, extractive metallurgy. Business course. Broad outlook. Box 7-130.

METALLURGIST: Age 29, married, one child, B.S. degree in science. Experience in spring and wire mill laboratory, analyzing phosphating and plating baths, taking, developing and reading microphotographs, structure reading, physical testing. Location immaterial. Box 7-135.

METALLURGICAL ENGINEER: B.S. degree, age 27, family. Three years experience with large steel company doing laboratory, metallurgical inspection, follow-up work. Three years in ferrous foundry, supervising development and production of shell molding and ductile iron. Desires responsible position in shell molding, ductile iron work with progressive company. Box 7-140.

MECHANICAL ENGINEER: Indian student, age 30, here on student visa, B.S. degree in physics, chemistry and mathematics, B.E. degree in mechanical engineering, M.S. in mechanical engineering, from Columbia University, Cornell University, Pennsylvania State College. Experience as lecturer, mechanical designer, draftsman. Desires mechanical engineering position. Box 7-145.

METALLURGIST: M.S. in metallurgy, age 30, married, family. Seven years experience in production, research and development in field of stainless, high-temperature and corrosion resistant alloys. Experience includes supervision of research and development laboratory and work in steel melting department. Prefers western Pennsylvania but will consider other localities. Box 7-150.

MANUFACTURERS AGENTS

Wanted by well-known manufacturer of specialized industrial furnaces (oil-gas-electric). Excellent opportunity in each of these areas—New England States, Cleveland, Pittsburgh.

Box 7-10, Metals Review

WANTED:
Director of Steel Research

We want a thoroughly experienced research man to head up a metal and steel product program in a central midwest growing steel mill. Especially interested in receiving applications from those whose experience has encompassed research problems dealing with silicon and alloy steels. The lack of this experience need not disqualify likely candidates. Fine opportunity and bright future is ahead for the man who wants to organize a group to work at his direction. Give full details of experience and salary requirements. Replies will be held in strict confidence. Our people know of this situation.

Box 7-5, Metals Review

AIRCRAFT PROCESS CONTROL SUPERVISOR

Duties: To be responsible for direct supervision of group of employees engaged in investigation of processes and materials and setting up process control standards, including plastics. Must be able to make physical and chemical analyses of all types of raw materials.

Qualifications: Eight years training and experience required, including 4 years college training in metallurgy, chemistry and physics, plus 2 years general shop experience and 2 years experience in investigating and establishing material and process control procedures or equivalent.

Location: Southern California. Relocation allowance will be made.

Contact: Box 7-20 Metals Review.

WELDING ENGINEER

Excellent opportunity for man with engineering degree, experienced in metallurgy and welding, with particular reference to resistance welding of aluminum. Should have thorough experience in heat treating. Must be ready for supervisory responsibilities. Permanent position, salary commensurate with experience and ability. Write, giving full details of education and experience, to Howard Squires, Manager, Production Engineering, Telephone Division, Stromberg-Carlson Co., Rochester 3, New York.

SENIOR METALLURGIST

For applied research and development on reactor metals and components. An outstanding opportunity for a man with ability to do creative work. Laboratories located in suburban Pittsburgh, near excellent housing of all types. Your application will be handled promptly and confidentially. Please write to M. A. Schultz, WESTINGHOUSE ATOMIC POWER DIVISION, P. O. Box 1468, Pittsburgh 30, Pa.

LABORATORY AND DEVELOPMENT MAN

Ph.D. or equivalent, experienced in physical metallurgy, to administer chemical, spectrographic, X-ray analytical groups. Also, lead physical metallurgy development in aircraft metal. Direct experience in one/or preferably both activities required. Age to 45 years. AAA-1 firm located in southeast. In reply state fully all details including experience and indicating positions held and salary required.

Box 7-15, Metals Review

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AMERICAN SOCIETY FOR METALS
7301 Euclid Ave., Cleveland 3, Ohio

PHYSICAL METALLURGIST

Excellent opportunity open to a man who is qualified for, and interested in, development work in the field of applied nonferrous metallurgy. This work will be related to the operations of a processor of metal used in the A.E.C. program.

Applicants should have had advanced training at a recognized school and about five to ten years experience in foundry or metal forming activities. A well-rounded background in physical metallurgy would be desirable. Also they should be eligible for security clearance by the A.E.C.

Please submit complete resume of personal data, education, previous experience, salary received and references. All replies will be treated in confidence.

Box 7-25, Metals Review

WANTED: METALLURGIST

Manufacturer of refrigeration products, farm equipment and small arms, desires metallurgist. Young college graduate. Excellent opportunity to further knowledge and gain diversified experience in ferrous metallurgy.

Work covers metallography, quality control production heat treating, case, depth, hardness, microstructure, tensile strength, phosphatizing, plating, corrosion, report writing, etc.

Good starting salary with opportunity for advancement. Better than average insurance, health and retirement benefits.

Box 7-155, Metals Review

HOLDEN SALT BATHS FROM STOCK

F. O. B., New Haven, Connecticut, Detroit, Michigan, Los Angeles, California

LIQUID CARBURIZING BATHS AND CARBON REAGENTS—WATER SOLUBLE

	Case Depths	Operating Temperature Range	
Light Case 50	.001 - .005	1400 - 1650°F.	Carbon A
Light Case 200	.001 - .010	1400 - 1650°F.	Carbon D
Hard Case 250	.001 - .025	1400 - 1650°F.	Carbon E
Hard Case 400	.001 - .040	1450 - 1750°F.	
Hard Case 500	.001 - .075	1450 - 1750°F.	
Hard Case 600 for replenishment only		1450 - 1750°F.	

HOLDEN NEUTRAL SALT BATHS WITH ADDITIVES REQUIRE NO RECTIFICATION

DO THE FOLLOWING THINGS:

1. Increase Electrode Life.
2. Increase ceramic pot life.
3. Increase alloy pot life.

NEUTRAL SALT BATHS with ADDITIVES

Hardening 185-10	1000 - 1500°F.
Hardening 127-11	1300 - 1650°F.
Hardening 127-12	1300 - 1650°F.
Hard Brite AA-10	1450 - 2000°F.

High Speed Hardening Baths with Additives

High Speed Preheat 13-17-10	1200 - 1700°F.
High Speed 17-24AA-10	1750 - 2350°F.
High Speed 17-22AA-10	1700 - 2300°F.
Hy-Speed Case	950 - 1150°F.

NO METHYL CHLORIDE OR CARBON STICK REQUIRED WITH HOLDEN BATHS

TEMPERING BATHS:

Tempering 2	500 - 1100°F.
Tempering 310A, fused	325 - 1100°F.
Tempering 350 Pink	325 - 1100°F.

ANNEALING BATHS:

Anneal 975	1075 - 1650°F.

MARQUENCHING & AUSTEMPERING:

Marquench 296

Marquench Additive 356,—to clear up chlorides in austempering-martempering baths.

RECTIFIERS:

Rectifier A—for special descaling operations or added cleaning.

QUENCHING OILS:

Clear Quench Quench 500 Martoil Martoil K

WRITE FOR FREE LITERATURE

THE A. F. HOLDEN COMPANY

THREE F.O.B. POINTS—LOS ANGELES, DETROIT and NEW HAVEN